VALIDATION REPORT
GVK INDUSTRIES LTD.

VALIDATION OF THE
COMBINED CYCLE NATURAL GAS BASED GRID CONNECTED POWER PLANT AT JEGURUPADU, INDIA

REPORT NO. INDIA-VAL/164.49/2011

REVISION NO. 03

BUREAU VERITAS CERTIFICATION

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GVK INDUSTRIES LTD	Mr. A. Issac George

Summary:

Bureau Veritas Certification [BVCH] has made the validation of the **"Combined cycle natural gas based grid connected power plant at Jegurupadu, India"** project of GVK Industries Ltd., Hyderabad located near Jegurupadu village south east of Rajahmundry in east Godavari district, on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM rules and modalities and the subsequent decisions by the CDM Executive Board, as well as the host country criteria.

The validation scope is defined as an independent and objective review of the project design document, the project's baseline study, monitoring plan and other relevant documents, and consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final validation report and opinion. The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

The first output of the validation process is a list of Clarification and Corrective Actions Requests (CL and CAR), presented in Appendix A. Taking into account this output, the project proponent revised its project design document.

In summary, it is Bureau Veritas Certification's opinion that the project correctly applies the baseline and monitoring methodology AM 0029 version 03 and meets the relevant UNFCCC requirements for the CDM and the relevant host country criteria.

Report No.:	Subject Group:
INDIA-val/164.49/2011	CDM

Project title:

Combined cycle natural gas based grid connected power plant at Jegurupadu, India

Work carried out by:

Mr. Sanjay Patankar- Team Leader
Mr. R. Reghukumar[*]- Team Leader
Mr. R.S. Premkumar – Team member
Ms. Sapana Pednekar- Team Member
Mr. P. Srinivas[†] – Team Member
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Internal Technical Review carried our by:

Mr. H.B. Muralidhar- Internal Technical Reviewer

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Work approved by:

Mr. Flavio Gomes- Global Product Manager

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[*] Was involved in initial process of validation of the project including the site visit conducted during 2008
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Abbreviation used:

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CERC	Central electricity Regulatory Commission
CL	Clarification Request
CO_2	Carbon Dioxide
DOE	Designated Operational Entity
EIA	Environment Impact Assessment
GHG	Green House Gas(es)
I	Interview
IETA	International Emissions Trading Association
MoV	Means of Verification
NGO	Non Government Organization
PCF	Prototype Carbon Fund
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change
DNA	Designated National Authority
M & P	Modalities and Procedure
VVM	Validation and Verification Manual
MP	Monitoring Plan
IRR	Internal rate of return
NEWNE	North East West and North-East
APERC	Andhra Pradesh Electricity Regulation Commission
APM	Administered Price Mechanism
APPCC	Andhra Pradesh Power Co-ordination Committee
CEA	Central Electricity Authority
MoEF	Ministry of Environment & Forests
MoP & G	Ministry of Petroleum & Natural Gas
OM/ BM/CM	Operating Margin / Build Margin /Combined Margin
PLF	Plant Load Factor
GTG	Gas Turbine Generator
STG	Steam Turbine Generator
HRSG	Heat Recovery Steam Generator
kW/kWh	Kilowatt /Kilowatt-hour
MW/MWh	Mega Watt/Megawatt-hour
GW/GWh	Giga Watt /Gigawatt- Hour
SLM	Straight Line Method
PPA	Power Purchase Agreement
O & M	Operation and Maintenance

JMR	Joint Meter Reading
MMSCD	Million metric standard cubic meter per day
GCV	Gross Calorific Value
NCV	Net Calorific Value
SCM	Standard Cubic Meter
BCM	Billion Cubic Meters
TCF	Trillion Cubic Feet
NG	Natural Gas
LNG	Liquefied Natural Gas
PSED	Program on Energy and Sustainable Development
PP	Project Participant

1 INTRODUCTION

GVK Industries Ltd. has commissioned Bureau Veritas Certification to validate its CDM project "Combined cycle natural gas based grid connected power plant at Jegurupadu, India" (hereafter called "the project") near Jegurupadu village south east of Rajahmundry in east Godavari district.

This report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1 Objective

The validation serves as project design verification and is a requirement of all projects. The validation is an independent third party assessment of the project design. In particular, the project's baseline, the monitoring plan (MP), and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design, as documented, is sound and reasonable, and meets the stated requirements and identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM rules and modalities and the subsequent decisions by the CDM Executive Board, as well as the host country criteria.

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

The validation is not meant to provide any consulting towards the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Validation team

The validation team consists of the following personnel:

FUNCTION	NAME	CODE HOLDER*	TASK PERFORMED
Lead Verifier	Sanjay Patankar	☐ **Yes** ☒ **No**	☒ **DR** ☒ **SV** ☐ **RI**

Verifier	R.S. Premkumar	☐**Yes** ☒ **No**	☒**DR** ☐**SV** ☐**RI**
Verifier	Sapana Pednekar	☐**Yes** ☒ **No**	☒**DR** ☒**SV** ☐**RI**
Verifier	R.Reghukumar	☐**Yes** ☒ **No**	☒**DR** ☒**SV** ☐**RI**
Verifier	P. Srinivas	☐**Yes** ☒ **No**	☒**DR** ☒**SV** ☐**RI**
Technical Specialist	D.Sadashiva Bhat	☒**Yes** ☐ **No**	☐**DR** ☒**SV** ☐**RI**
Financial Specialist	Sushil Budhia & Associates	☐**Yes** ☒ **No**	☒**DR** ☐**SV** ☐**RI**
Internal Technical Reviewer (ITR)	H.B. Muralidhar	☒**Yes** ☐ **No**	☒**DR** ☐**SV** ☐**RI**
Work approved by	Flavio Gomes	☐**Yes** ☒ **No**	☒**DR** ☐**SV** ☒**RI**

*DR = Document Review; SV = Site Visit; RI = Report issuance

2 METHODOLOGY

The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In order to ensure transparency, a validation protocol was customized for the project, according to the version 01.2 of the Clean Development Mechanism Validation and Verification Manual, issued by the Executive Board at its 55th meeting on 30/07/2010. The protocol shows, in a transparent manner, criteria (requirements), means of validation and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The completed validation protocol is enclosed in Appendix A to this report.

2.1 Review of Documents

The Project Design Document (PDD) submitted by GVK Industries Ltd. and additional background documents related to the project design and baseline, i.e. country Law, Guidelines for Completing the Project Design Document (CDM-PDD), Approved methodology, Kyoto Protocol, Clarifications on Validation Requirements to be Checked by a Designated Operational Entity were reviewed.

To address Bureau Veritas Certification corrective action and clarification requests, GVK Industries Ltd. revised the PDD and resubmitted it on 16/07/2012.

The validation findings presented in this report relate to the project as described in the PDD version 06.

2.2 Follow-up Interviews

On 01/07/2008 & 02/07/2008, Bureau Veritas Certification performed a site visit and interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Another site visit was also conducted on 17.10.2011. Representatives of GVK Industries Ltd. were interviewed (see References). The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organization	Interview topics
GVK Industries Ltd.	• Project Design and implementation • Technical Equipment and operation • Compliance with National Laws and regulations. • CDM consideration • Benchmark Analysis • Additionality • Monitoring Plan
Local Stakeholder	• Views and concerns about the project activity
General Carbon Advisory Services Pvt. Ltd. [CDM consultant]	• Baseline Determination • Additionality • Benchmark Analysis • Monitoring Plan • GHG Calculation • Environmental Impacts

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to raise the requests for corrective actions and clarification and any other outstanding issues that needed to be clarified for Bureau Veritas Certification positive conclusion on the project design.

Corrective Action Requests (CAR) is issued, where:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
(b) The CDM requirements have not been met;
(c) There is a risk that emission reductions cannot be monitored or calculated.
The validation team may also use the term Clarification Request (CL), if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

To guarantee the transparency of the verification process, the concerns raised are documented in more detail in the verification protocol in Appendix A.

2.4 Internal Technical Review

The validation report underwent an Internal Technical Review (ITR) before requesting registration of the project activity.

The ITR is an independent process performed to examine thoroughly that the process of validation has been carried out in conformance with the requirements of the validation scheme as well as internal Bureau Veritas Certification procedures.

The Lead Verifier provides a copy of the validation report to the reviewer, including any necessary validation documentation. The reviewer reviews the submitted documentation for conformance with the validation scheme. This will be a comprehensive review of all documentation generated during the validation process.

When performing an Internal Technical Review, the reviewer ensures that:

> The validation activity has been performed by the team by exercising utmost diligence and complete adherence to the CDM rules and requirements.
>
> The review encompasses all aspects related to the project which includes project design, baseline, additionality, monitoring plans and emission reduction calculations, internal quality assurance systems of the project participant as well as the project activity, review of the stakeholder comments and responses, closure of CARs, CLs and FARs during the validation exercise, review of sample documents.

The reviewer compiles clarification questions for the Lead Verifier and Validation Team and discusses these matters with Lead Verifier.

After the agreement of the responses on the 'Clarification Request' from the Lead Verifier as well as the PP(s) the finalized validation report is accepted for further processing such as uploading on the UNFCCC webpage.

3 VALIDATION CONCLUSIONS

In the following sections, the conclusions of the validation are stated.

The findings from the desk review of the original project design documents and the findings from interviews during the follow up visit are described in the Validation Protocol in Appendix A.

The Clarification and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Validation Protocol in Appendix A. The validation of the Project resulted in 17 Corrective Action Requests (CARs) and 18 Clarification Requests (CLs).

The CARs and CLs were closed based on adequate responses from the Project Participant(s) which meet the applicable requirements. They have been reassessed before their formal acceptance and closure.

The number between brackets at the end of each section correspond to the VVM paragraph

3.1 Approval (49-50)

The only party involved in the project activity at this stage is India, which is the host party for the project activity. The project participant has obtained a letter of approval (Ref /5/) from the Ministry of Environment and Forests, which is the DNA of India. The following supporting documentation was also received:

1. Application to the DNA for Host Country Approval (HCA) dated 12/06/2008(Ref/4//1/)
2. Invitation letter from DNA for HCA meeting dated 14/07/2008 (Ref/4/)

The validation team confirmed the authenticity of the approval from the website of DNA of India[3]. The project activity is listed under I.D.no. 1040-08 in the large scale project activities list on the Indian DNA's web site. The title of the project activity in the web hosted PDD is the same as in the letter of approval (Ref/5/) from the DNA. The project ID no. has been provided by DNA to PP. The Project ID no. also matches with DNA's invitation letter to the PP for HCA meeting (Ref/4/). Hence it is confirmed that the HCA accorded by DNA of India with project ID 1040-08 is for the project activity titled "Combined cycle natural gas based grid connected power plant at Jegurupadu, India" as stated in webhosted PDD.

The DNA's letter of approval with file number 4/13/2008-CCC dated 03/09/2008 clearly states that India has ratified the Kyoto Protocol and the approval is for voluntary participation in the CDM project activity. Also, the letter of approval mentions that the project activity contributes to sustainable development. The DNA approval refers to the precise proposed CDM project activity title in the PDD being submitted for registration. The letter is unconditional with respect to party to the Kyoto Protocol, voluntary participation, contribution to sustainable development and title of project activity. The validation team confirms that this letter is in accordance with paragraphs 45 – 48 of VVM version 1.2.

Bureau Veritas Certification received this letter from the project participant and does not doubt its authenticity since validation team verified the original copy of the HCA approval and also confirmed the authenticity of approval from the website of DNA of India

3.2 Participation (54)

The participation for the project participant has been approved by India, which is a Party to the Kyoto Protocol. This was checked from UNFCCC website http://maindb.unfccc.int/public/country.pl?country=IN.

The participation is approved by DNA and is accepted. The validation team concluded this by reviewing the Host Country Approval (HCA) (Ref/5/) which describes the participation of GVK Industries Ltd.,being approved by the Government of India. The project activity was webhosted on the UNFCCC for global stakeholder comments as per CDM requirements. The project was webhosted from 31/05/2008 to 29/06/2008[4]. There were no comments received from stakeholders for the project activity during webhosting period.

3.3 Project design document (57)

[3] http://www.cdmindia.in/reports_list_details.php?id=Large&reporttype=3&page=12
[4] http://cdm.unfccc.int/Projects/Validation/DB/82ORS4DFFAE3F7JI64VMOSYQEYXGCB/view.html

The validation team hereby confirms that the PDD complies with the latest forms of the guidance documents for completion of the PDD. The PDD is as per Guidelines for Completing the Project Design Document (CDM-PDD) (Ref /46/)

3.4 Changes in the Project Activity

During the site visit following changes were observed in project as compared to details mentioned in webhosted PDD. The PDD, Version 6 have the following major changes with respect to version 02 which was webhosted.

1. The project capacity was changed from 220 MW to 228 MW in the revised version, as a result of CAR-1 raised by the validation team.
2. The project financials also are worked out on the basis of the revised capacity of 228 MW and not 220 MW due to the CAR-1 raised.
3. The project boundary is described in diagrammatic form instead of a description due to CAR -3 raised.
4. The alternatives of power generation using other fuels such as naptha, lignite and also technology of super-critical power plants are also considered in the revised PDD, due to CAR- 4 raised by the team.
5. The justification for meeting applicability condition of the AM 0029 methodology pertaining to sufficient availability of natural gas has been revamped in the revised PDD and is presented with more details and supporting references in the Appendix 1 of the PDD, as a result of the CAR-13 raised by the validation team.
6. The additionality of the project activity has been justified in the revised PDD on the basis of investment benchmark analysis, in response to CAR-15 that was raised during the validation. The same was not included in the web hosted PDD.
7. The project implementation schedule and the progress of CDM activities are shown more clearly in the revised PDD due to CAR-16 raised.
8. Input values considered in the investment analysis such as O&M charges in the webhosted PDD were based on the EPC contract, which document came into being after the date of the investment decision. CAR-17 was raised by the team and in response; these values are justified in the revised PDD on the basis of data from the time of the investment decision.
9. The sensitivity analysis had been done over a range of +/- 5% in the webhosted PDD and was revised to +/-10 % in the revised PDD, as a result of CAR-12. Also, the sensitivity analysis has been presented for IRR working also. In the web hosted PDD, this was only for the levelised cost.
10. The webhosted PDD had limited the sensitivity analysis to two parameters only: PLF and fuel cost. Additional parameters of project cost, station heat rate, O&M cost, O&M escalation, loan interest rate and auxiliary consumption were also included in the revised PDD in response to CL-8 raised by the team.
11. The default value for fugitive CH_4 upstream emissions was taken as 160 tCH_4/ PJ and was changed to 296 tCH_4/PJ as a result of CAR-6 raised.

12. The web hosted PDD had included a provision for the computation of leakage emissions attributable to LNG. However, the validation team, while visiting the project site on 17/10/2011 observed that no use of LNG was possible in the project activity and only natural gas could be used. The same was also clarified in the Project Participant's response to CL-5 raised by the team. The Project Participant has revised the PDD sections B.6.1 and B.6.3 to delete references to LNG.
13. The grid emissions due to electricity imports from the grid are accounted for in response to CAR-11 raised.
14. The baseline emission factor $EF_{BL,CO2}$ is included as an ex-post monitored parameter in the monitoring plan of the revised PDD, after CAR-10 was raised.
15. Some of the monitoring parameters were not clearly described or included in sections B.7.1 and B.7.2 of the webhosted PDD. These have been included in the monitoring plan of the revised PDD as a result of CAR-11 raised.
16. Names of stakeholders who commented at the local stakeholders meeting are also included in the revised PDD after CAR-9 was raised by the team.
17. The web hosted PDD had two project participants listed in it. One of them, Cantor Fitzgerald Europe was removed and the revised PDD now contains the name of only one Project Participant, viz., GVK Industries Ltd. This was done after CL-1 was raised by the validation team.

Details of the Corrective Action Request (CARs) and Clarification Request (CLs)raised, the responses of the project participant and the closure of the CARs and CLs are provided in Appendix A of this report. The closure remarks explain the project participant's responses and their assessment by the validation team.

3.5 Project description (64)

The process undertaken to validate the accuracy and completeness of the project description

The project activity is the construction and operation of a new natural gas based 228 MW power plant. It includes one ALSTOM 13E2 dual fuel Gas Turbine, one ALSTOM make triple pressure unfired HRSG and one ALSTOM make Steam Turbine as the main power generating equipment.

In accordance with the requirements specified in paragraph 62 of the VVM ver. 1.2, the validation team along with the technical expert conducted a physical visit to the project site on 17/10/2011 and confirmed the installation of this equipment at the site. The power plant was commissioned on 14/04/2009, as seen from the letter issued by Andhra Pradesh Power Co-ordination Committee (APPCC) (Ref/6/)which states the C.O.D. (Commercial operation date) of the plant.

The validation team has noted the equipment capacity from the name plate details during the site visit. The capacities are as follows:

Gas Turbine generator Alstom 13E2 : 210,000 kVA
Power factor : 0.8

Steam turbine generator	: 110,000 kVA
Power factor	: 0.8

However, the nameplate capacities can be realised only under standard test conditions. The actual capacity is lower, since it depends upon the site conditions. During the commissioning test of the power plant approved by Andhra Pradesh Power Coordination Committee, the gross generation capacity in the test corrected for site conditions was demonstrated to be 228.85 MW. This can be confirmed from the letter dated 13.05.2009 (Ref /6/) issued by the Andhra Pradesh Power Co-ordination Committee, in which the demonstration of gross generation capacity is stated as 231.98 MW. The Andhra Pradesh Power Co-ordination Committee has also issued a letter dated 14.07.2009, (Ref /7/) in which the capacity has been stated after correction for site conditions such as ambient temperature, atmospheric pressure, humidity, frequency and base load conditions such as ambient temperature, atmospheric pressure, humidity, frequency and base load conditions and the same is 228.85 MW.

As the actual installed capacity is higher than the stated in webhosted PDD, the validation team had raised CAR-1 regarding the difference in stated capacity of the power plant. The project participant has explained that the PPA had contracted a capacity of 220 MW and to be able to realise the same, after accounting for all auxiliary consumption and also future capacity degradation that could occur, the eventual plant capacity selected was 228 MW. This is also the capacity that was quoted by the EPC contractor of the plant, Alstom (Ref /17/). The explanation provided was accepted by the team which observed that in the revised PDD, the financial analysis was also carried out on the basis of the capacity as 228 MW. This makes the financial analysis more conservative as compared to the previous analysis carried out with capacity as 220 MW. Hence, the CAR-1 was closed by the team.

During the site visit carried out on 17/10/2011, the validation team along with the technical specialist who was accompanying the team have confirmed the power plant configuration at the site. The Gas turbine in the project activity is a single shaft machine with the compressor and turbine sections assembled in a single casing. Compressed air exits the unit compressor and is passed to the Combustion Chamber of the gas turbine where Natural Gas is fired. The hot gases generated in the Combustion Chamber as the products of the combustion enter the turbine. Heat energy in the hot gases in the combustion chamber of the gas turbine is converted into mechanical energy. The temperature of the gases exiting the turbine was observed to be about 1100ºC for the temperature indicating instruments at the power plant control room.

The gas turbine output electrical energy is controlled by regulating the flow rate of the natural gas fuel sent to the combustion chamber. The validation team noted that the gas turbine is designed for option of dual firing. However, the project participant has stated in the PDD that only one type of fuel, viz., natural gas would be used in the project activity. The exhaust gas from the turbine is sent to a HRSG (Heat Recovery System Generator). The heat in the exhaust gas is converted to steam which runs the steam turbine generator (STG). The exhaust gases after giving away heat in the HRSG are dispersed through the stack at about 100ºC. The team also confirmed at the time of its observations during the site visit that the HRSG is an unfired type and no supplementary firing is involved.

BVCH hereby confirms on the basis of its site visit observations and the review of all supporting documentation that the project description in the revised PDD is accurate and complete in all respects and that there are no changes to the project activity/design or boundary as compared to the webhosted PDD.

3.6 Baseline and monitoring methodology

3.6.1 General requirement (76-77)

The steps taken to assess the relevant information contained in the PDD against each applicability condition of the AM 0029 methodology applied to the project activity are described below.

Applicability condition 1:

"The project activity is the construction and operation of a new natural gas fired grid-connected electricity generation plant"

The gas based power plant set up by GVK Industries at the Jegurupadu site is a newly constructed power plant. GVK signed a series of contracts with M/s. Alstom for the Engineering, Procurement & Construction (EPC) of the natural gas power plant. The EPC contracts entered into with Alston are as follows:

1) EPC Contract for C.I.F. (Cost, Insurance & Freight) supplies for the 228 MW power plant was signed for the overseas supply of the GT (Gas Turbine), ST (Steam Turbine) and the electrical generators in the project activity on 14 June 2003 with M/s. Alstom (Switzerland) Ltd.
2) EPC Contract for ex-works supplies from M/s. Alstom's India factory was signed on 14 June 2003 with Alstom Projects India Ltd. for the supply of equipment manufactured in Alstom factory in India
3) Contract for services for the 228 MW power plant signed with Alstom (Switzerland) Ltd. on 14 June 2003.

The validation team reviewed the above contracts and confirms that the project activity is the construction of a new natural gas fired power plant.

The observations at the project site by the team, along with the accompanying technical expert and the review of relevant plant records (Ref /27/ & /38/) have also confirmed that the plant runs on natural gas as the fuel. No other fuel is proposed to be used in the project activity. The proposed amendment to the PPA (Ref /25/) dated 26.05.2008 has also specified that natural gas would be the only fuel to be used. The project activity therefore meets the applicability condition of the AM 0029 methodology which stipulates that natural gas should be the primary fuel to be used.

At the time of the site visit, it was confirmed by the validation team that the power plant was connected to the grid. The power generated by the plant is evacuated through the switchyard at the site directly to the Southern grid at the grid voltage of 220 kV. The validation team had visited the switchyard and carried out a physical inspection to confirm that the project activity is grid connected. The validation team also reviewed the Commercial Date of Operation (C.O.D.) from the letter issued by Andhra Pradesh Power Co-ordination Committee dated 13/05/2009 (Ref /6/) which indicates that the project activity is connected to the grid.

Applicability condition 2:

"The geographical/physical boundaries of the baseline grid can be clearly identified and information pertaining to the grid and estimating baseline emissions is publicly available"

The project activity is located in the Southern Indian state of Andhra Pradesh. The electricity grid system in India is divided into two grids, viz., the NEWNE Grid comprising of the grids in the northern, eastern, north-eastern & western states and the Southern grid which extends to the Southern states of Tamil Nadu, Andhra Pradesh, Karnataka and Kerala. The information on the grid system in India is available on the Ministry of Power Central Electricity Authority (CEA) database which is made publicly available on the CEA web site[5].

The project activity is connected to the Southern grid. Therefore, as per the AM 0029, the Southern grid is also the baseline grid for the project activity.

The geographical/physical boundaries of the baseline grid, i.e. the Southern grid, are clearly identifiable as extending to the Southern states in India. Information pertaining to the baseline grid also is available from the CEA database, publicly available on the CEA's web site referred in the footnote.

Thus, this applicability condition of the methodology is met by the project activity.

Applicability condition 3:

"Natural gas is sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity"

The PDD has provided a calculation of the natural gas requirement for the project activity, which is based on the full generation of power as per the plant capacity of 228 MW at 100% PLF. This assumes that the plant will run throughout the year without interruption. This is only a theoretical assumption; however, the gas consumption by the plant with this value of the PLF assumed can be the maximum possible and the plant will not require any additional gas over and above such a quantity computed. The calculation also uses values of station heat rate (1850 kcal/kWh) and the net calorific value of natural gas (8570 kcal/SCM). With this calculation, the maximum gas consumption by the plant is 1.1 mmscd. It was verified from the gas supply contracts (Ref /18/) signed by GVK Industries with GAIL (Gas Authority of India Ltd.) and indicates that this quantity of gas supply had been contracted and was assured to the project activity.

[5] http://www.cea.nic.in/planning/c%20and%20e/government%20of%20india%20website.htm

The scenario for gas availability and demand has been presented in the PDD in section B.2 and Appendix 1 of the PDD. As of the time of the initiation of the project activity, gas exploration by petroleum companies such as Reliance Industries Ltd. and Cairn India had discovered the presence of natural gas off the coast of the state of Andhra Pradesh to the extent of 10 trillion cubic feet. Gas reserves in India had existed in the off-shore Bombay High basin and inland in the state of Gujarat and the North Eastern states; however, the exploration studies by these companies indicated substantial reserves in the Krishna – Godavari (KG) basin (off the coast of Andhra Pradesh) as well. Reserves of gas were also found off the coast of the state of Tamil Nadu.

The gas supply for the project activity is slated to come from the gas reserves in the KG basin. The Ministry of Petroleum's gas allocation letter (Ref /19/) dated 08/07/1999 has stated that the gas allocation of 1.1 mmscd for GVK's project would be from the KG basin. The initial gas supply contract between GVK Industries Ltd. and GAIL dated 05.10.1999 had stated that the gas supply would be made from the Oil & Natural Gas (ONGC) fields located at Tatipaka, Pasarlapudi, Kesanapalli, Mori and other nearby fields and also from the Ravva off-shore field. The subsequent amendments to the gas supply contract also state that the gas supply would come from these locations.

However, the project participant later signed contracts for supply of gas with Reliance Industries Ltd. (Ref /20/). As per the contract with Reliance, the gas would be sourced from KG basin block D-6, a site where gas had been found by Reliance in 2002.

The project activity therefore will receive its supply of gas from the new sources of gas at the KG basin and not from any other source elsewhere in the country. The gas linkages for other projects that depended or would continue to depend on sources other than the KG basin would hence not be impacted due to the gas supply to the project activity and those commitments would continue as before.

The validation team also referred to its own sources to cross-check the information in the PDD. The sources referred are available in the public domain over the internet. From the sources referred, it could be known that Reliance Industries Ltd (RIL) had already struck gas in 2002, in the KG D6 block, having reserves of up to 11.5 TCF, as reported in a similar news article in a leading financial daily, Business Standard. The article, published on 01/09/2008 and available on the web link http://www.business-standard.com/india/news/ril-gearsfor-kg-basin-gas-production/333108/, also reports that RIL had plans to initially produce 40 mmscd of gas from these reserves and then increase the output to 80 mmscd within the next 5-6 months from the start of production.

A similar news report available on the web link http://www.kgbasin.in/gspc-discoveries/ has stated that Gujarat State Petroleum Corporation (GSPC) had discovered an even larger gas reserve of 20 trillion cubic feet in the KG basin well #8 on 17th June 2005 and this was followed up by another find, a year later, on 2nd June 2006, which was capable of giving a yield of 4.8 mmscd. A conservative estimate of the recoverable gas from this source is however, put at 10 TCF, as per the information obtained by the validation team by referring to a news item published in the Sunday , November 12, 2005 edition of the Business Line; a reputed financial daily of the Hindu Group of publications. The news item is available as a publicly viewable reference on the web link http://www.thehindubusinessline.in/2002/11/10/stories/2002111001580100.htm

Thus, the information on gas reserves in the KG basin included by the project participant in the PDD – Appendix 1 was verified and found to be credible.

An independent report prepared by the leading consultants Price Waterhouse Coopers for India Brand Equity Foundation provides the statistics of gas supply and its consumption from the year 1999-00 onwards up to 2004-05. The gas consumption in India during the year 2004-05, according to the report was 30.77 BCM. This consumption is for the entire country, not only for the power sector but also for all other sectors, including priority sectors such as fertilisers. The quantity of the gas reserves in the KG basin alone, taken conservatively at 20 TCF also, is therefore equivalent to over two million times the annual gas consumption of the entire country during 2004-05 for all sectors. This is taking only the reserves found by RIL and GSPC. There are other companies in the fray as well, such as ONGC and Cairn India who are also engaged in exploration and it is expected that they would also report more discoveries in the same sector.

Therefore, on the basis of this information it can be considered that gas reserves in the KG basin are substantial in measure and are in abundance to meet the gas requirements in the near term future. The availability will also be ensured through the development of projects to tap the gas potential and the setting up of a gas transmission infrastructure to convey the gas to the actual users. The Ministry of Petroleum & Natural Gas of the Government of India mentions several measures taken by the Government to encourage the availability of natural gas to various sectors in the country, such as the efforts being made to set up a transmission and distribution network. The scenario of Gas production and distribution in India is described in the Ministry of Petroleum & Natural Gas official web site http://petroleum.nic.in.

The PDD has stated in Appendix 1 that the Ministry of Petroleum & Natural Gas of the Government of India had invited expressions of interest from power producers for booking capacity in a gas pipeline that was proposed to be set up by Reliance Industries. LANCO had applied to the Ministry of Petroleum and Natural Gas for the same for two of their projects of capacities 740 MW (Kondapalli) and 1100 MW (Korukonda), as reported by the DNA newspaper in a news article published on 04/12/2006 and available as a news clipping from the Press Information Bureau of the Government of India (Ref /29/). NTPC's Ratnagiri power project, which would consume 2.7 mmscd of gas (and therefore of capacity comparable to the project activity) had also applied for capacity booking in the proposed pipeline, as confirmed by a news article in the Economic Times dated 04.12.2008(Ref/30/).

The validation team noted that AM 0029 methodology requires the natural gas applicability condition to be shown for other project activities of size comparable to the project activity. The LANCO and NTPC projects are of capacities much larger than the project activity and were still considered eligible for the capacity booking. The team agrees with the project participant's contention in the PDD, therefore, that supply of gas was available to the large scale gas based power projects even after the setting up of the project activity and that the project activity itself did not result in any deprivation of gas to these plants coming up in the future.

The project participant has quoted the report of Infraline (Ref/28/) which has provided the demand-supply scenario of the XIth Five Year Plan prepared by the Planning Commission of India in 2003 (i.e. the same year in which the project activity started its operations) and adopted by the Government of India to chart future economic growth and development of the country, as a reference to demonstrate the supply-demand scenario. The report was prepared by Infraline Energy and Information services which is an information portal that provides information database for the Indian energy sector. The report is available on Infraline's web site www.infraline.com. The report indicates that from the year 2007-08 up to 2011-12, the total supply of natural gas would keep pace with the demand.

The validating team of BVCH did not rely only on the references and sources quoted by the project participant in the PDD but also carried out its own research into the existing and projected demand – supply conditions for natural gas that existed at the time of initialising the project and thereafter. Statistics pertaining to gas availability and demand within India were referred to by the validation team. In doing so, the team noted, however, that the demand projections for natural gas have been made by various agencies and differ widely.

The Indian Ministry of Petroleum and Natural Gas on its web site http://petroleum.nic.in has published this data. The figures indicate that the registered demand for Gas with the Gas Authority of India (the main agency that markets the gas in India) as of the year 2005 was 260 mmscd. However, the Government of India had also appointed an expert group to assess the realistic demand for natural gas. The expert group assessed the demand for gas at 146 mmscd (i.e. approx. 53.29 bcm per year) by the year 2000 and 188 mmscd (i.e. approx. 68.62 bcm per year) by 2004-05.

The validation team accessed through the internet, the working paper #65 “The future of natural gas in India: a study of major consuming sectors” authored by Mike P. Jackson along with collaborators from A.T.Kearney, Gurgaon, The Indian Institute of Management, Ahmedabad and The Integrated Research for Action and Development (IRADe). The comprehensive working paper (Ref/31/) has been published by the Program on Energy & Sustainable Development (P.E.S.D.) of Stanford University in October 2007 and seeks to present a scenario about the future of natural gas in India.

The gas demand projections for the future (year 2020) have been made by various sources and vary widely. The paper has recognised that it is difficult to project the demand for natural gas due to the dual pricing and supply regime[6] prevalent in India as also the possibility of significant new supplies in the near future, both of which could affect the demand scenario. The demand for gas would also be influenced by policy changes in the power sector. Reforms in the coal sector leading to a greater availability of coal would cause a shift in consumer preference from gas to coal (owing to cheaper cost of coal) and vice versa. Regional air pollution controls would also be a factor in creating a demand for gas as a preference over coal due to the lower sulphur emissions caused by gas as compared to coal. It is therefore, inherently difficult to project the demand for gas. However, the estimate made in a more recent (2006) Government of India report, viz., Integrated Energy Policy - Report of the Expert Committee which has been referred to in the paper can be taken as acceptable and the same has projected the demand for natural gas at 110 bcm.

The same working paper published by P.S.E.D. also provides natural gas availability figures over the period 2005 to 2025. According to the estimates published in this paper, gas availability would peak by 2015 at 120 bcm and is estimated to remain at 115 bcm by year 2025, which would balance the projected demand of 110 bcm.

The projected availability of natural gas also takes into consideration Liquefied Natural Gas (LNG). Another working paper published by the P.E.S.D. (# 43) has stated that in addition to production of natural gas by the private parties such as Reliance, Cairns India, etc., there are also LNG re-gasification terminals being constructed in India. Two of these terminals are already in operation. One of them is at Dahej in the state of Gujarat (owned by Petronet LNG) and the other one, owned by Shell, is located at Hazira in Gujarat state. Together, these two terminals have a capacity of up to 30 mmscd, which can provide a sizeable supply of re-gassified LNG to the market.

[6] Within India, there prevails a hybrid gas market comprising of state players such as Oil & Natural Gas Commission (ONGC) and Oil India. Gas prices for supply to the priority sectors such as power and fertilisers are state regulated. Private gas producers such as Reliance have been permitted under the New Exploration Licensing Policy (NELP) to exploit gas reserves and market the gas at market determined prices.

The meth panel has provided a clarification (CLA_0091)[7] relating to the applicability condition for the availability of natural gas. The clarification issued states that the applicability criterion of the methodology does not exclude natural gas imports into the country or region. Thus, it would be appropriate for the project participant to describe the supply scenario in India, having considered both, i.e. gas available within the country as also the gas imports. It has been clarified by the meth panel in CLA-0091 that the applicability criteria of the AM 0029 methodology would be met as long as it is shown through monitoring that the project activity's demand for natural gas would not lead to shortages in gas supplies to other projects within the country. With the help of the sources of information referred to in the PDD and also cross-checked by the validation team, the team is of the opinion that the availability has been sufficiently demonstrated through monitoring of the supply and demand conditions that could be expected.

The validation team, by referring to the sources listed in the PDD by the project participant to demonstrate sufficient availability of natural gas, as well as on the basis of its own research was therefore able to conclude that the gas availability in the country would primarily be sufficient to meet the expected demand and hence, the project activity would not constrain future power capacity additions of comparable size.

BVCH hereby confirms that the selected baseline and monitoring methodology AM 0029 version 03 and the tool referred by the methodology, viz., the Tool for the demonstration and assessment of additionality version 06 of EB 39 Annex 10 is previously approved by the CDM Executive Board, and is applicable to the project activity, which, complies with all the applicability conditions therein.

The methodology AM 0029 also refers to the Tool to calculate the emission factor for an electricity system version. The Build margin (BM) and Operating margin (OM) emission factors used to compute the combined margin (CM) emission factor are based on the CEA database. The BM & OM available in the CEA database are calculated using the procedures specified in this tool. For this project activity, version 03 of the CEA database was used and the same is based on version 3 of the Tool to calculate the emission factor of an electricity system. The validation team has confirmed that this version of the database was the latest available at the time of the start of validation and hence, use of the CEA database version 03 is regarded as appropriate by the team.

The tool to calculate the emission factor for an electricity system has undergone four updates since the date of publication of the PDD for global stakeholder comments. The revision 2 in particular, pertains to the option available to the Project Participant of including off-grid power plants in the computation of the grid emission factor. However, the CEA database used by the Project Participant for calculating the combined margin and build margin includes only the grid connected power plants and thus, the Project Participant has not exercised the option of including the off-grid plants in the calculation.

[7] http://cdm.unfccc.int/filestorage/A/M/_/AM_CLAR_6869E5NXF2D4KK62WGK7LZXIWI6CDW/Clarifications%20to%20AM0029%20ver.%202?t=NWN8bHU0ZnF2fDBMDDMvqPlDEvqJhHIn0mXJ

Also, revision 2.1.0 of the tool allowed the use of an operating margin different from zero in case the connected electricity system is located in a different host country. The project activity is connected to the Southern electricity grid of India and hence, this provision of the tool is not applicable.

The validation team has therefore accepted the use of version 3 of the CEA database based on an earlier version of the Tool to calculate the emission factor for an electricity system, as use of this version of the database is still in line with the latest version of the tool, viz., version 2.2.1.

The AM 0029 methodology has specified CO_2 as the main emission source in both baseline as well as the project activity. The PDD has also considered the same GHG and other gases are excluded for simplification. This is as per the methodology. During the site visit, the validation team also confirmed that there are no other emission sources apart from CO_2 generated in the project activity as project emissions. The main fuel used is natural gas and its combustion gives rise to only CO_2 gas as an exhaust.

BVCH hereby confirms that, as a result of the implementation of the proposed CDM project activity, there are no greenhouse gas emissions occurring within the proposed CDM project activity boundary, which are expected to contribute more than 1% of the overall expected average annual emissions reductions, which are not addressed by the applied methodology

3.6.2 Project boundary (80)

BVCH validated the project boundary in the following manner:

a. The spatial extent of the project boundary is assessed through the description in the PDD and the grid structure in India as known from the official data available from the Central Electricity Authority (CEA) (Ref/55/). The project activity boundary therefore includes the project plant and also all power plants connected physically to the Southern electricity grid of India that the CDM project power plant is itself connected to. The grid connectivity of the project plant was verified by the validation team during its site visit on 17/10/2011. The power plant is physically connected to the grid, as observed from a physical inspection at the project site switchyard from where the electricity generated by the plant is evacuated to the grid. The project activity is a new plant that has been set up and the validation team confirms from the site visit observations that the following equipment have been set up as a part of the project activity :
    a) Gas turbine and generator (GTG)
    b) Heat recovery steam generator (HRSG)
    c) Steam turbine generator

The team has confirmed that the above equipment can be regarded as a part of the project boundary. The delineation of the project boundary is also clearly marked on the plant layout drawing GVJ02BA00…GA002 (Ref/32/) submitted by the project participant to the validation team.

The project participant has selected CO_2 as the emission that will take place in the project activity. These emissions are accounted for in the project emissions calculations presented in section B.6.1 & B.6.3 of the PDD and validated by BVCH in section 3.6.4 of this report. The validation team noted in its observations at the project plant and the discussions held with the project participant's representatives that the power plant uses natural gas as fuel. As the combustion of natural gas gives rise to CO_2 emissions, the consideration of this gas as an emission source is regarded as appropriate by the validation team.

The consideration of only CO_2 gas for the baseline emissions is conservative and is in line with the methodology and hence appropriate. In the absence of the project activity, an equivalent of energy generated by the project activity would be produced in the grid. The power plants connected to the grid are mainly fossil fuel fired plants, as the southern grid of India is dominated by such plants and hence, the emissions taking place in the baseline would also be CO_2 emissions.

The electricity imported by the project activity ($EG_{import,y}$) is accounted for as a separate monitoring parameter in the monitoring plan. The validation team confirms that there are no other sources of GHG emissions in the project boundary, other than the CO_2 emissions referred to above as project emissions.

The project design is sound and the geographical (Jegurupadu Village, Rajahmundry, East Godavari District in the state of Andhra Pradesh, India) and temporal (15 years) boundaries of the project activity are clearly defined. Project participant has taken a lifetime of 15 years for the project plant. The validation team has accepted this as the lifetime as the Appendix –II of the CERC tariff regulations (Ref/56/) dated 26-March-2001, which gives the depreciation schedule for various categories of power plants, has also indicated the lifetime of gas based plants to be 15 years.

Based on the above assessment, BVCH hereby confirms that the identified boundary and the selected sources and gases are justified for the project activity.

3.6.3 Baseline identification (87-88)

The steps taken to assess the requirement given in paragraph 81 and 82 of the VVM are described below:

The AM 0029 methodology mandates the determination of the baseline for the project activity on the basis of the identification of alternative scenarios. In the PDD, the Project participant has identified various plausible scenarios as alternatives to the project activity. The following scenarios were identified:

a) The project activity itself not implemented as a CDM project activity.

The methodology requires the project activity to be considered as a plausible alternative and the same has been considered in the PDD. Hence, this is a plausible scenario.

b) Power generation using Natural Gas as the fuel but with different alternative technologies.

The project participant has taken into consideration the power generation with a capacity of 228 MW (i.e. same as the project activity) but run on the open cycle mode of operation, as one of the alternatives. In the open cycle mode of operation, power generation takes place in the gas turbine generator and the heat content of the exhaust gas exiting the turbine is not utilised further. This is a simpler mode of operation and was identified as having about 15% lower efficiency than the combined cycle. Thus, a gas turbine plant using the open cycle will consume a higher amount of fuel (natural gas). This will have the effect of increasing the cost of electricity generation (COG) which is the financial indicator used for baseline identification, making the generation of power through the open cycle an uneconomical option, compared to the combined cycle. This illustrates the large difference that exists between the two modes of operation of gas based power project and the higher cost of power generation in the open cycle due to the higher fuel consumption.

This is further justified from the Central Electricity Authority, Government of India reports[8] 'Performance Review of Thermal Power Stations 2007-2008' and 'Performance Review of Thermal Power Stations 2006-07'. Page 1 of both reports state "Use of combined cycle operation in the field of Gas Turbines is being promoted for energy conservation. Further, current CEA database also shows that there is not even a single power plant in the range of +/-50% of the capacity of the project activity, based on open cycle, operating in India. Hence, this option is not considered feasible to be implemented.

The validation team of BVCHH affirms, therefore, that the assumptions and data used in the identification of the baseline scenario, viz., the open cycle plant efficiency are justified appropriately, are supported by evidence and can be deemed reasonable, in line with the requirement of paragraph 87 (c) of the VVM.
The other alternative considered is the operation of the gas turbine power plant in cogeneration mode, which produces both power and steam. Although this option results in a high efficiency of operation, it is possible to utilise the steam produced in this option only if there is an industrial facility which needs the steam. There is however, no such facility in the vicinity of the project activity. The purpose of the project activity is to export power to the grid and hence, the outputs from a co-generation plant are different from the project activity. Since this alternative provides outputs which are different from the project activity, it is not considered to be a valid alternative.

c) Power generation using coal as fuel

This alternative meets the requirement under the methodology which stipulates the consideration of alternatives based on power generation technologies using energy sources other than natural gas. The use of coal as a fuel for power generation is widespread in the host country.

[8] http://www.cea.nic.in/reports/yearly/thermal_perfm_review_rep/0607/SECTION-10.pdf

The methodology has stated that identified alternatives need not necessarily be available only to the project participant, but to other stakeholders as well, as long as they are within the grid boundary.

The validation team observed that as on the date of decision to invest in the project activity, there were two coal based IPPs (Independent Power Producers) already under development in the state of Andhra Pradesh. The team has confirmed from the web links[9] that there were two such plants, viz.

(1) 2x260 MW coal-based plant of BPL Power Projects (AP) Ltd. at Ramagundam[10]
(2) 2x520 MW Visakhapatnam Power Project by Hinduja National Power Corpn. Ltd

Since these plants were being set up in the state of Andhra Pradesh, they would eventually be connected to the Southern grid.

It therefore establishes that the setting up of a coal based power plant within the grid boundary was a feasible option to stakeholders other than the project participant.

The project participant GVK Industries Ltd. is one of the leading infrastructure companies, engaged in the business of building power plants across India. In the month of January 2002, GVK was also awarded a coal mine for a 500 MW coal based power plant that they had decided to put up at Govindwal Sahib in the state of Punjab. The validation team verified this through the web link (http://coal.nic.in/alloblocklist.htm). Thus, this indicates, that setting up a coal based plant would have been a realistic option even for the project participant.

The alternative of power generation by a coal based power plant within the grid boundary was therefore a plausible alternative to the project activity.

d) *Power generation using lignite as fuel*

The web hosted PDD did not explain why power generation using lignite as the fuel was not considered as an alternative. The validation team raised a clarification request (CL-18). Project participant, clarified in their response that lignite based plants need to be located in proximity to the mining areas, owing to the property of spontaneous combustion of the fuel. Also, the only lignite based power plant in Southern India belonged to the Neyveli Lignite Corporation (NLC), which is a public sector undertaking and has its own captive mines which are a source for the fuel. The lignite mined by NLC is used for its own generation purposes and not sold to other users. Hence, this alternative, though included in the revised version of the PDD, is not regarded as a plausible baseline option. The validation team closed the clarification request upon the explanation provided by the Project Participant and verification of the same through the references provided in the PDD[11].

[9] http://www.financialexpress.com/printer/news/63579/ and http://www.processregister.com/Visakhapatnam_Power/Project/pid6967.htm; http://hindujanationalpower.com/

[10] http://www.financialexpress.com/printer/news/63579/

[11] www.benetechusa.com/pdf/article/SpontaneousCombOfPRBCoal.pdf, http://www.indiaenergyportal.org/subthemes_link.php?themeid=10&text=coal# http://www.nlcindia.co.in/index.php?file_name=products//products_01.htm

The validation team has also referred to CEA CO_2 baseline database version 3 which contains information on the thermal power plants in the Southern grid and confirmed that the only 3 lignite based power plants operational in the grid are those of the NLC.

Thus this indicates, that lignite based power generation is not an alternative open to IPPs like GVK Industries as a result of the constraints involved in setting up lignite power plants as such plants would have to be set up essentially as pit head plants close to the mining areas.

e) Power generation through a coal based super-critical power plant

This alternative was not included in the web hosted PDD. The project participant decided to include its consideration in the revised version of the PDD. However, it is explained that at the time of the project participant's investment decision in Feb 2003, no coal based super-critical power plants had been constructed in India. The earliest such plant was decided to be set up in 2006, as confirmed from the web reference http://www.ese.iitb.ac.in/aer2006_files/papers/031.pdf and http://goliath.ecnext.com/coms2/summary_0198-211733_ITM

The CEA CO_2 baseline database (ver.3), in its list of power plants set up within India, also does not indicate any super-critical power plant in operation at that time. The validation team confirmed from the web reference that the first super-critical power plant in India set up by the Adani Group went into operation in December 2010 as confirmed from the web site of Adani Power (http://www.adanipower.com/Press%20Release/pressrelease.htm). A press report appearing in the Economic Times dated 24/12/2010 and accessible through the web link http://articles.economictimes.indiatimes.com/2010-12-24/news/27622884_1_power-plant-mundra-in-kutch-district-mundra-port also confirms this.

The validation team therefore agrees that coal based super-critical power generation was not a credible alternative at the time of the investment decision and its exclusion from the alternatives considered, is justified.

f) Power generation using naptha as a fuel

This alternative was also not a part of the web hosted PDD. The project participant decided to discuss the same in the revised version of the PDD. The alternative is excluded; however, as the Government of Andhra Pradesh did not consider proposals for setting up naptha based power plants due to the high price volatility of naptha. Reference to this is found in the Andhra Pradesh electricity Regulatory Commission (APERC) order of 12/04/2003.

The CEA CO_2 baseline database ver. 3 also confirms that in none of the operational thermal power plants in the Southern grid, was naptha used as the primary fuel. The use of naptha is seen only as a secondary fuel, to be used in the case of unavailability of the main fuel (gas). The prices of naptha also exhibit high volatility, making the power generation unviable for the producer. The validation team checked this from information on commodity prices provided by the Senior Economic Advisor, Ministry of commerce & Industry, Government of India on their web site www.eaiindustry.nic.in. The prices of naptha from the base year 2004-2005 up to 2010-11 indicate wide fluctuation in naptha prices. The overall price of naptha has also shown a steep increase over these years. The validation team therefore accepted that naptha based power generation was not a feasible alternative to the project activity.

g) Power generation using diesel/oil as fuel

The CEA CO_2 baseline database indicates that there were only 7 diesel based power generation plants and 3 oil fired plants in operation in the year 2003, in which the decision to invest in the project activity was taken by GVK.

Moreover, since the year 2002, the Government of India dismantled the pre-existing Administered Pricing Mechanism (APM) through which it was possible for the Government to regulate the prices of petroleum prices such as diesel, oil etc. As a result of the price de-control, the prices of these fuels rose to meet parity with international prices. The validation team therefore agrees with the project participant's exclusion of this alternative from consideration, as it would not be economical for any power producer to set up a plant of such a large capacity of 228 MW with the use of diesel or oil as fuel.

h) Power generation using nuclear fuel

This alternative, though listed in the PDD, is accepted by the validation team as not being credible enough due to the serious doubts over the availability of nuclear fuel. Many of the nuclear power plants in India are operating at reduced load factor only because of fuel availability issues. Moreover, the alternative is at best realistic only for the Government entity Nuclear Power Corporation, which is the only entity in India that is permitted to develop such plants.

i) Hydro-electric Power generation

Hydro-electric power projects could be either

1) Storage reservoir type projects or

2) Run-of-the-river type projects.

The former type of hydro projects are essentially designed to meet the peak load power requirements. The project activity would be providing base load power to the grid. Since storage hydro projects would not be able to provide the same type of service, viz., base load power, they are not regarded as an alternative that could provide a service comparable to the project activity and are therefore not considered in the baseline analysis.

Run – of – the - river type of hydro projects, even whenever they are able to deliver a PLF comparable to the project activity depend totally on the availability of water resources for the power generation. Such a plant, even when operating would not be able to produce enough power for the grid during the lean seasons, when the flow of water in the river is reduced. The plant would also be subject to the uncertainties of monsoons. Hydro-electric power plants also have a much longer gestation period as compared to a gas based power plant like the project activity. The hydro power plant also needs to be set up at a location which offers an acceptable level of power generation potential.

Hence, this alternative was excluded from consideration by the project participant as it is not a realistic and credible option.

j) Power generation from wind

Wind power generation has a very low PLF. Also, the power generated is of infirm nature due to varying wind speed conditions. Hence, this alternative would not be able to fulfil the requirement of being able to provide base load power comparable to the project activity and was therefore excluded from consideration by the project participant and also accepted by the validation team.

k) Electricity imports from connected grids

The methodology mandates the consideration of this alternative. The same is also discussed in the PDD. The validation team however agrees that imports from connected grids in India are not realistic because those grids themselves are deficient in power. The statistics provided in the CEA CO_2 baseline database (Ref/55/) illustrate this fact. Hence, the validation team accepts the exclusion of this alternative from consideration.

The analysis of alternatives leaves only two options for further consideration:

1) *The project activity itself not implemented as a CDM project activity &*
2) *Power generation using coal as fuel*

The validation team accepts these alternatives for the determination of the baseline due to the following reasons:

- It is technically possible to set up both the alternatives. The capacity of 228 MW can be set up either as a gas based plant (project activity itself). It would also be possible to set up a coal plant as a unit of 250 MW capacity, as explained and justified in sections 3.6.4 and 3.7.3 of this report. Thus, both the alternatives are realistic.
- The power generation capacity added to the grid would comprise of thermal power plants. Both the alternatives are thermal power plants and hence they are credible alternatives.
- The alternatives are capable of providing base load power to the grid. Hence, the type of service provided by the alternatives is the same as that of the project activity

- The outputs of both alternatives are similar to the project activity. The coal based power plant taken as an alternative is considered to have a capacity of 250 MW while the project activity has a capacity of 228 MW. However, the methodology permits the alternatives considered to have an output different from the project activity, as long as similar services are delivered. As the alternatives are capable of delivering base load power to the grid, the type of service delivered is the same as the project activity and meets the requirement of the methodology
- The alternatives identified for baseline selection are available to stakeholders within the grid boundary which is also as per the methodology requirement.
- All relevant power plant technologies have been considered in the analysis and their efficiencies and technical lifetime are also included in the PDD.
- The alternatives selected are in compliance with legal and regulatory requirements in the host country.

The validation team therefore confirms that the selection and short listing of candidate baseline alternative scenarios is in line with the **Step 1** of the AM 0029 methodology.

The validation team cross-checked the following information stated in the PDD:

Information in PDD	Source used to cross-check
Combined cycle plant efficiency of 50%	The heat rate guaranteed by the EPC agreement is 1850 kcal/kWh (on G.C.V. basis) which translates into 1682 kcal/kWh on N.C.V. basis. The plant efficiency is therefore 50%, applying standard conversion formula[12]
Open cycle plant efficiency- 34%	Checked against the website reference www.energymanagertraining.com
Thermal Efficiency of power generation using gas turbine in cogeneration mode- 63%	Bureau of Energy Efficiency in India's notes available on their web site www.bee-india.nic.in have indicated the cogeneration efficiency for gas based combined cycle power plants to be in the range of 69% to 83%. The efficiency value mentioned in the PDD is however, not relevant to the project activity, as gas based cogeneration is not a realistic alternative, since the project activity is meant to generate and supply only power to the grid and no heat generation and use is envisaged.
Efficiency of coal based power plant-34 to 36%	The CERC regulation of tariff dated 26/03/2004 has specified a gross station heat rate for coal power plants in stabilised working to be 2500 kcal/kWh. Using standard conversion referred to above, the plant efficiency therefore comes to 34%
Efficiency of diesel based power plants- 50%	CERC terms and conditions of tariff determination dated 01/04/2004 specify the gross station heat rate for liquid fuel based power plants as 1900 kcal/kWh, which is equivalent to 45.3% plant efficiency by means of the standard conversion referred to in footnote 1 above.

[12] I kWh = 859.9 kcal

Overall efficiency of naptha based power plant in combined cycle-39%	Checked against the website reference www.energymanagertraining.com which specifies the plant efficiency for gas turbine open cycle of operation.
Life time of diesel based power plants-15 years	The CEA office memorandum dated 14.12.1995 specify the lifetime of diesel power plants to be 15 years. The CEA memorandum is available at their web site www.powermin.nic.in
Life time of coal & lignite based power plant-25 years	The lifetime of coal based power plants is checked against information provided on fair life of power plants specified in the Government of India-Ministry of Power Gazette publication of – March 1994
Life time of gas & naptha based power plants-15 years	The lifetime of gas based power plants is checked against information provided on fair life of power plants specified in the Government of India-Ministry of Power Gazette publication of – March 1994
Lifetime of hydro power plants-35 years	The lifetime of hydroelectric power plants is checked against information provided on fair life of power plants specified in the Government of India-Ministry of Power Gazette publication of – March 1994

Step 2 of the methodology requires the identification of the economically most attractive scenario among the selected alternatives as the baseline scenario, by using investment analysis. The project participant has carried out the investment analysis in line with the guidance provided by the "Tool for the demonstration and assessment of additionality" version 06 (Ref /49/).

The project participant has demonstrated an investment comparison analysis. The validation team regards this as appropriate since the Step 2 requires the baseline identification to be done on the basis of the economically most attractive scenario and for that purpose a comparison will have to be made between the two short listed alternatives (1) & (2) to determine which of the two is economically the more attractive option; hence, an investment comparison analysis is appropriate in this case.

The financial indicator chosen for the investment analysis is the levelised cost of electricity generation. The validation team accepts that this is an appropriate indicator for the purpose of the analysis as it gives the cost per unit of service delivered (i.e. kWh or unit of electricity produced) and is therefore as per the Sub-Step 2 (b) of the Additionality tool.

The project participant has presented the investment comparison analysis for both the alternatives in the form of MS-excel spreadsheets in which the levelised cost of generation for both the alternatives is worked out (Ref/59/). Section 3.7.3 provides details of the critical techno-economic parameters and assumptions (such as capital costs, fuel price projections, lifetimes, the load factor of the power plant and discount rate) applied in the analysis and the validation justification for the assumptions made by the project participant. The investment analysis is presented in a transparent manner and all the relevant assumptions have been provided in the PDD also. The validation team could reproduce the analysis and arrive at the results.

The PDD summarises the results of the investment comparison analysis, viz, the levelised cost of generation for both the alternatives. The levelised cost computed is as follows:

Sr. No.	Alternative	Levelised cost of generation
1.	*The project activity itself not implemented as a CDM project activity*	IN` 1.54 per kWh
2.	*Power generation using coal as fuel*	IN` 1.43 per kWh

The levelised cost of generation for the alternative of power generation using coal as fuel is lower than for the project activity implemented without CDM benefits. This implies that power generation using coal is economically a more attractive alternative than the project activity set up without any CDM benefits.

These results are also tabulated in the PDD.

The project participant has also carried out a sensitivity analysis for both the alternatives, to confirm that the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions made in the analysis. The validation team's assessment of the results of the financial analysis and sensitivity is included in the section 3.7.3 of this report. The sensitivity analysis also confirms that the levelised cost of generation for alternative - 2, viz., power generation using coal is an economically more attractive option than the project activity implemented without CDM benefits.

On the basis of the same, the baseline scenario is identified as the "Generation of power in the grid through a coal based power plant". The validation team agrees that the baseline is correctly identified and is in line with the AM 0029 methodology requirements and the Additionality Tool.

The identified baseline scenario is also as per paragraph 81 of the VVM (Ref/60/) and is the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity.

Based on the above assessment, BVCH hereby confirms that:

(a) All the assumptions and data used by the project participants are listed in the PDD, including their references and sources;

(b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD;

(c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;

(d) Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;

(e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

The information contained in the PDD was cross-checked by BVCH's validation team from sources of information provided by the Project participant and also the CEA CO_2 baseline database, which provides authentic data on the power plants operating in the host country. The CEA database is publicly accessible through its web site http://www.cea.nic.in/planning/c%20and%20e/government%20of%20india%20website.htm

3.6.4 Algorithms and/or formulae used to determine emission reductions (92-93)

The steps taken to assess the requirement outlined in paragraph 89 of the VVM are described below:

The project participant has used the algorithms and formulae in accordance with the methodology applied viz. AM 0029 version 03 (Ref/48/) and Tool to calculate emission factor for an electricity system. The detailed algorithms and/or formulae used in the calculations of baseline emissions, project emissions, leakage and emission reductions are explained in section B.6.1 of the PDD. The validation team confirms that the formulae have been applied correctly in line with the applied methodology AM 0029 Version 03.

Baseline emissions (BE_y)

The PP has calculated the baseline emissions by multiplying the electricity generated in the project plant (EGPJ,y) with the baseline CO2 emission factor (EFBL,CO2,y). This is as per the requirement of applied methodology AM 0029 Version 03 for the calculation of baseline emissions. The project participant has calculated the baseline CO2 emission factor for the Southern grid, which is the baseline grid as reported in section 3.6.3 above.

The AM 0029 methodology requires the project participant to calculate the baseline CO2 emission factor as the lowest among three options:

Option I: The build margin (BM), calculated according to "Tool to calculate emission factor for an electricity system".

The value of build margin emission factor has been taken directly by the Project Participant from the CEA database version 3 for the Southern grid. This value is 705.4tCO2e/GWh. The validation team referred to the CEA database and verified that the value has been correctly taken.

Option II: The combined margin (CM), calculated according to "Tool to calculate emission factor for an electricity system", using a 50/50 OM/BM weight.

The project participant has used data from the CEA database version 3(Ref /55/) to arrive at the value of the combined margin emission factor. The combined margin emission factor is a weighted average of the Operating Margin (OM) and Build Margin (BM) emission factors. The build margin is directly specified by the CEA database for the year 2006-07 (i.e. the year in which the CDM-PDD was submitted to BVCH for validation). The operating margin is calculated as the simple average for the recent 3 years preceding the year in which the CDM–PDD was submitted to the BVCH for validation, i.e. 2004-05, 2005-06 & 2006-07. The PP has taken these values form the CEA database and calculated the combined margin from those values as a weighted average, applying 50/50 OM/BM weight, as prescribed by the methodology.

The value of CM calculated in the above manner was verified by the validation team and confirmed to be 854.4tCO_2e/GWh. The validation team confirms that the project participant has used the values of OM correctly from the CEA database version 03.

Option III: The emission factor of the technology (and fuel) identified as the most likely baseline scenario under "Identification of the baseline scenario"

Option III specified in the methodology requires the project participant to compute the emission factor for the technology and fuel identified for use in the baseline scenario. An assessment of the baseline scenario is presented in section 3.6.3. The baseline scenario, as validated by BVCH, is "the generation of power from a coal based thermal power plant". The Project participant has therefore computed the emission factor for the baseline coal based power plant according to the equation (3) specified in the methodology.

$EF_{BL,CO2}$ (tCO_2/MWh) = {($COEF_{BL}$)/η_{BL}}*3.6 GJ/MWh

The fuel emission coefficient $COEF_{BL}$ in tCO_2/GJ is the value of emissions in tCO_2 per GJ of energy generation by the baseline fuel, i.e. coal. The project participant has taken this value from the CEA CO_2 database version 3. The CEA database value is more conservative as compared to the corresponding value given in Table 1.4 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The value from CEA database is $0.0958tCO_2e/GJ$. The value considered by the Project Participant is according to the methodology since it is based on the national average fuel data coming from the CEA database.

The energy efficiency of the technology used in the baseline is the thermal efficiency (η_{BL}) of the coal based power plant that would generate the same of amount of power ($EG_{PJ,y}$) as the project activity plant. To arrive at the value of efficiency for a coal based power plant, the project participant has used CEA database version 3. The database provides values of the following:

i) net energy generation in GWh

ii) station heat rate in kcal/kWh

iii) Gross calorific value (G.C.V.) of the fuel used in the power plant, viz., coal

for all operational thermal power plants within the grid boundary of the Southern grid. This includes coal based plants also, for which these values are provided by the CEA database. At the time of the submission of the PDD to BVCH for validation, there were 4 coal based power plants operating in the Southern grid, for which the above data was available from the CEA database. These plants are the following:

1) R Gundem STPS of 500 MW capacity
2) Simhadri Unit 1 of 500 MW capacity
3) Simhadri Unit 2 of 500 MW capacity &
4) Raichur 210 MW capacity plant

The operating data for these 4 plants was used to derive the energy efficiency η_{BL} as there is no other source of data available to the project participant, which can provide the required data to the same level of authenticity as the CEA database.

With the help of this data from an authentic and reliable publicly available source as the CEA database, it was possible for the project participant to work out the thermal efficiencies of the operating coal based thermal power plants in the Southern grid. The efficiency calculated for above listed first three coal plants was 36.7% whereas the efficiency of the fourth plant was calculated as 35.6%.

It is agreed by the validation team that the energy efficiencies of these thermal power plants operating on coal as a fuel would serve as a credible proxy for the energy efficiency η_{BL} to be calculated for the baseline coal based power plant for this project activity, due to the following reasons:

a) The 4 power plants identified use similar technology of power generation, viz, sub-critical Rankine cycle of operation to produce power from steam. The baseline plant for the project activity also is a sub-critical power plant; hence, the two technologies are similar

b) The baseline power plant uses coal as the fuel. All the above identified power plants also use coal as the primary fuel

c) The capacity of the baseline coal based power plant is considered to be 250 MW. The four power plants identified are of capacities of 500 MW each (3 out of the 4 plants) while the fourth plant's capacity is 210 MW. Taking the efficiency of a higher sized plant of 500 MW as a basis for the calculation of the baseline 250 MW coal plant efficiency is appropriate because the higher sized plant (of 500 MW) is expected to run at a better efficiency than a plant of lower capacity of 250 MW; hence, this would be a conservative estimation of the baseline plant efficiency. The fourth plant Raichur has a lower capacity of 210 MW. Its energy efficiency also is slightly lower (35.6%) than the other 3 plants (36.7%). The project participant, however, has considered the higher of the two efficiency values (i.e. 36.7%) in the estimation of η_{BL}. The validation team has accepted the same, since it will lead to a more conservative estimation of the emission factor $EF_{BL,CO2,y}$.

The value of baseline CO_2 emission factor calculated with the third option (Option III) as described above is **938.7** t CO_2/GWh.

The CO_2 emission factor for Option I (Build margin) is the lowest of the three options. As stipulated by the methodology, therefore, the project participant has taken the lowest value (705.4tCO_2e/GWh), among the three options as the baseline CO_2 emission factor for the project activity ($EFBL,CO_{2,y}$).

The expected electricity generation by the project activity, on the basis of the plant load factor assumed (85%) and the plant capacity (228 MW) comes to 1697.68 GWh. However, part of this generation would also be consumed by the plant itself for the running of auxiliary equipment of the plant (auxiliary consumption). This is assumed to be at 3% of the plant capacity (also justified in the table in section 3.7.3 of this report). The net generation by the project activity is therefore estimated as 1646.8 GWh. This the electricity that the project activity would export to the grid for every year of its operation and corresponds to the parameter EGPJ,y of the methodology.

The values of Plant Load Factor (PLF) and auxiliary consumption have

been validated by BVCH and a justification of BVCH's assessment is presented in section 3.7.3 of this report.

With the estimated net generation ($EG_{PJ,y}$) of 1646.8 GWh, the baseline emissions were calculated by the project participant using equation (2) of the methodology

$BE_y = EG_{PJ,y} * EF_{BL,CO2,y}$

The baseline emissions are calculated as 1646.8 GWh * 705.4 tCO_2/GWh = 1,161,623 tCO_2 per year.

Project Emissions (PE_y)

The project activity involves the generation of power using natural gas as the fuel. As natural gas is a fossil fuel, its consumption in the project activity as a fuel will lead to CO_2 emissions that will also need to be accounted for as project emissions.
The project emissions are calculated as per equation (1) of the methodology

$PE_y = \sum_f FC_{f,y} * COEF_{f,y}$

$FC_{f,y}$ denotes the quantity of natural gas that is combusted in the gas based power plant. This is in volumetric units (m^3). The gas volume is considered in standard cubic meters (SCM) of volume. This measure corresponds to standard conditions of temperature (zero degrees Celsius) and absolute pressure (0.986atm), commonly abbreviated as STP conditions. The gas volume measured in terms of SCM is therefore independent of the actual conditions of gas flow that could vary from time to time.

The gas combusted in the project activity has been estimated on the basis of

i) expected electricity generation in the plant $EG_{PJ,y}$ (GWh)

ii) station heat rate value of the plant (kcal/kWh) &

iii) the net calorific value (N.C.V.) of the natural gas (kcal/SCM)

Expected electricity generation $EG_{PJ,y}$

This is calculated on the basis of the plant's installed capacity of 228 MW and the expected PLF (assumed as 85%). A detailed justification of the PLF is provided in the following section 3.7.3 of this report.

This value is calculated as 1698 GWh/year. [$EG_{PJ,y}$ = (228 MW * 24 hours * 365 days * 85% PLF)/1000 = 1698 GWh/year]. A detailed calculation of $EG_{PJ,y}$ is also given in the worksheet BE_y & PE_y of the ER spreadsheet (Ref /40/) submitted by the Project Participant.

Station Heat Rate (SHR)

The station heat rate assumed by the project participant was validated by the team and its justification of the same is included in section 3.7.3 of this report. This value is taken as 1850 kcal/kWh on GCV basis or 1682 kcal/kWh on NCV basis.

Net Calorific Value (G.C.V.) of Natural Gas

The Gross Calorific value of natural gas is assumed to be 10000 kcal/SCM for which a detailed justification is provided by the validation team in section 3.7.3 of this report. The net calorific value (N.C.V.) of the natural gas is derived from the G.C.V. by means of a simple conversion factor which is discussed below.

From these values, the gas consumption can be calculated. The project participant has calculated this to be 333,162,491 SCM/year (equivalent to 0.91 SCM /day) which is the quantity $FC_{f,y}$ [a detailed calculation is presented by the PP in the worksheet BE & PE of the ER spreadsheet- Ref/40/]

$$FC_{f,y} = \frac{[EG_{PJ,y}\ (1698GWh/year)*10^6 *SHR\ (1850kcal/kWh)]}{[NCV\ (8570kcal/SCM)]}$$

= 333,162,491 SCM/year

COEFf,y is the emission coefficient of the natural gas used as the fuel. It is calculated as specified by equation (1a) of the methodology

$$COEF_{f,y} = \Sigma NCV_y * EF_{CO2f,f,y} * OXID_f$$

The value of NCVy is the net calorific value of natural gas in GJ/m3. Project participant has assumed this value as 8570 kcal/SCM. The NCV of natural gas is related to the Gross Calorific Value (G.C.V.) through the following

Net Calorific value = Gross Calorific Value* (100%- Delta G.C.V./N.C.V.)

The Delta G.C.V/N.C.V. is specified in the CEA CO_2 baseline database version 3 as 10% and the same value used in the above formula gives the N.C.V. for natural gas as 9000 kcal/SCM. However, the project participant was already operating a gas based power plant and sample fuel supply invoices for that plant from GAIL for the month of May 2003 was seen by the validation team. The average G.C.V. in that invoice was mentioned as 9430 kcal/SCM, for which the N.C.V. comes to 8572 kcal/SCM. Hence, the value of N.C.V. assumed as 8570 kcal/SCM is more appropriate for the calculation of project emissions as it leads to a more conservative computation of the same.

The CO_2 emission factor $EF_{CO2,NG,y}$ for natural gas is based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Ref/59/). This value is 56.1tCO_2/TJ or 0.0561 t CO_2/GJ

$OXID_f$ which is the oxidation factor of natural gas is taken as 1. The assumption indicates a complete combustion of the fuel and can be considered as valid.

On the basis of these values, the $COEF_{f,y}$ is calculated as

$COEF_{f,y} = 8570\ kcal/SCM * 56.1\ tCO_2/TJ * 1 * (4.186 \times 10^{-9})$

$= 0.002013\ t\ CO_2/\ SCM$

The numerical factor 4.186×10^{-9} is to convert kcal into TJ

The project emissions calculated with the above values and by applying the equation (1) of the methodology, come to 670,500 tCO_2e. This value is for project emissions resulting from the combustion of natural gas only, as the use of LNG is not envisaged in the project activity during normal situations.

Leakage (LE_y)

According to the AM 0029 methodology, leakage emissions need to be taken into account to calculate the emission reductions. The leakage emissions are due to

a) Fugitive CH_4 emissions associated with fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of natural gas used in the project plant and fossil fuels used in the grid in the absence of the project activity [$LE_{CH4,y}$] &

b) In the case LNG is used in the project plant: CO_2 emissions from fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression into a natural gas transmission or distribution system. [$LE_{LNG,CO2,y}$]

The fugitive CH_4 emissions ($LE_{CH4,y}$) are calculated net of those that would have occurred in the baseline scenario. This is allowed by the methodology as per the equation (5)

$$LE_{CH\,4,y} = \left[FC_y \cdot NCV_y \cdot EF_{NG,upstream,CH\,4} - EG_{PJ,y} \cdot EF_{BL,upstream,CH\,4}\right] \cdot GWP_{CH\,4}$$

FCy is the quantity of natural gas combusted in the project activity and is estimated to be 333,162,491 SCM/year (this is justified from detailed calculations presented in the worksheet BE & PE of the CER spreadsheet (Ref /40/), which were validated by the validation team]. The value is calculated on the basis of

- electricity generation EGPJ,y by the project plant (in GWh)
- station heat rate of the plant in kcal/kWh &
- the net calorific value (N.C.V.) of natural gas kcal/SCM

These values are justified in section 3.7.3 of this report. The electricity generation is calculated on the basis of plant's installed capacity of 228 MW and the expected PLF of 85% (justified in section 3.7.3 of this report).

The calculations of $EG_{PJ,y}$ and $FC_{f,y}$ are also explained in the preceding paragraph of "Project emissions"
$EF_{NG,\ upstream,\ CH4}$ is the emission factor for fugitive upstream emissions for natural gas. As reliable and accurate national data on fugitive upstream emissions associated with the production, transportation and distribution of natural gas is not available, the project participant has opted to use the default value specified under Table 2 of the AM 0029 methodology (Ref /48/). This value is 296 tCO_2/PJ; applicable to rest of the world countries other than the USA/Canada, Eastern Europe/Former USSR and Western Europe.

$EF_{BL,\ upstream,\ CH4}$ is the emission factor for upstream fugitive methane emissions occurring in the absence of the project activity. The methodology has specified how this value should be calculated, depending upon which among the 3 options (Option 1, 2 & 3 under the methodology) was considered to arrive at the baseline emission factor $EF_{BL,CO2,y}$.

As explained in the preceding paragraph of "Baseline emissions", $EF_{BL,CO2,y}$ corresponds to the Option 1, viz., the build margin calculated according to the Tool to calculate the emission factor for an electricity system. Hence, the project participant has used the following equation given by the methodology to calculate $EF_{BL,\ upstream,CH4}$.

$$EF_{BL,upstream,CH4} = \frac{\sum_j FF_{j,k} \cdot EF_{k,upstream,CH4}}{\sum_j EG_j}$$

Each of the quantities in the above equation has been calculated using authentic data from the version 3 of CEA database that was applicable at the start of the validation. The detailed calculations are presented in worksheets "Plants considered" and "Fug-EF" of the Emission Reduction spreadsheet (Ref/40/) submitted to the validation team. The team has verified the correctness of data and the computations. The validation team has confirmed that the calculation is consistent with the calculation of CO2 emissions in the build margin and the combined margin, i.e. the same cohort of plants and data on fuel combustion and electricity generation have been used. This is because the CEA database provides the value of the operating and builds margin emission factors and also includes a listing of all the plants supplying power to the respective grids. Thus, the calculation carried out is in line with the requirement of the methodology. The following values for the above quantities are confirmed:

$FF_{j,k}$ is the quantity of the fossil fuel type 'k' consumed in the respective power plant 'j'

The project activity would be supplying power to the Southern grid. The fossil fuel based power plants in the southern grid use the following types of fuels:

-coal
-lignite
-gas
-diesel
-oil

From the CEA database, values of the fuel consumption of each of these fossil fuel types was taken and multiplied by the respective default emission factor for the fuel type prescribed in Table 2 of the methodology. The default emission factors applied are as below:

Type of fossil fuel used in the power plant	Value of the default emission factor $EF_{k, upstream,CH4}$ considered	Justification
Coal	0.8 tCH_4 per ktonne	This value is specified as the default value for surface mining of coal. Validation team has referred to the web site www.coalindia.in of Coal India Ltd., the major producer of coal in India. The information provided therein states that 88% of the coal mined in India is from open pit mines. Hence, it can be concluded that majority of the coal produced in India is surface mined.
Lignite	0.8 tCH_4 per ktonne	The value considered is the same as for coal, since lignite also is produced from open cast mines in India. Information available from the web site www.nlcindia.com of Neyveli Lignite Corporation, a major producer of lignite in the country, also states that "lignite deposits in India occur in sub-surface deposits".

Gas	296 tCH_4 per PJ	The methodology specifies this as the default value for fugitive CH_4 upstream emissions of natural gas in rest of the world countries (such as the host country India, for this project activity) other than USA/Canada, Eastern Europe/former USSR and Western Europe. Hence this value is justified.
Oil & diesel	4.1 tCH_4 per PJ	This is the default value for fugitive emission factor for oil specified in the methodology; hence is justified. The same value is also considered for diesel. The methodology does not differentiate between oil and diesel and hence, a common value of fugitive emission factor for both the fuels is justified

Apart from the above values, the other assumptions made in calculating the value of emission factor for upstream fugitive emissions in the absence of the project activity ($EF_{BL, upstream, CH4}$) are justified as follows:

Parameter assumed	Value applied	Justification
N.C.V. of natural gas	8570 kcal/SCM	The Gross Calorific Value (G.C.V.) of Natural Gas is taken as 10000 kcal/SCM. This value is validated by the team and explanation for the same is provided in section 3.7.3 of this report. The Net Calorific Value (N.C.V.) is derived from the G.C.V. through a conversion factor (Delta GCV/NCV), taken from CEA CO_2 baseline database. Further, a conservative value of the G.C.V. itself is assumed on the basis of actual fuel supply invoices of GAIL to the project participant's previously existing plant.
Average calorific value of oil	9619 kcal/kg	The CEA CO_2 baseline database for the Indian power sector has specified GCV of oil to be 10100 kcal/m^3. The database has also specified conversion factor delta GCV/NCV for oil and the same is 5%. Hence, the N.C.V. of oil would come to 9619 kcal/m^3
Net power generation in the build margin	29995 Million units (GWh)	This value is the summation of the electricity generation by all the power plants connected in the Southern grid. These include fossil fuel plants as well as non-fossil fuel plants such as hydro and nuclear plants. This is as per the

∑EGj		methodology
Quantity of coal and lignite combusted in power plants in the build margin	11,073,242,804 tonnes per year	This value is taken from the CEA CO_2 baseline database version 3, valid and applicable at the time of the start of validation
Quantity of gas combusted in power plants in the build margin	1,410,955,106 SCM/year	This value is taken from the CEA CO_2 baseline database version 3, valid and applicable at the time of the start of validation
Quantity of oil & diesel combusted in power plants in the build margin	328,470 tonnes per year	This value is taken from the CEA CO_2 baseline database version 3, valid and applicable at the time of the start of validation
GWP_{CH4}	21	The global warming potential for GHG methane is a known standard value.

The detailed computation of the fugitive upstream methane emissions occurring in the absence of the project activity $EF_{BL,upstream,CH4}$ is presented in the CER spreadsheet submitted by the project participant to the validation team. The calculations therein were verified by the team.

Accordingly, the value of $EF_{BL,upstream,CH4}$ is confirmed by the team as 16.03 tCO_2 per MU.

As per the methodology, the leakage emissions from fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression into a natural gas transmission or distribution system $LE_{LNG,CO2,y}$ are to be calculated as per the equation:

$$LE_{LNG,CO2,y} = FC_y \cdot EF_{CO2,upstream,LNG}$$

$FC_{,y}$ is the quantity of natural gas combusted in the project activity and is calculated to be 333,162,491 SCM/year. An explanation for the consideration of this value is stated in the paragraphs above.

$EF_{CO2, upstream, LNG}$ is the Emission factor for upstream CO_2 emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system. As reliable and accurate data on the same is not available, the project participant has chosen the default value of this emission factor, prescribed by the methodology to be 6 tCO_2 per TJ.

The project activity does not use Liquefied Natural Gas (LNG). Only Natural Gas is used as a fuel. The validation team has confirmed this during the site visit carried out on 17/10/2011. As a consequence, the leakage emissions due to LNG liquefaction, transportation, re-gasification and compression into natural gas will therefore be zero. The leakage emissions are calculated using equation (5) of the methodology and are confirmed as 45891 tCO_2 per year.

Emission reductions (ER_y)-

From the values of baseline emissions, project emissions and leakage emissions, the emission reductions are calculated as

ERy = BEy – PEy – LEy
and confirmed to be 448,988 tCO_2 per year.

The estimated annual average of 448,988 tCO_2e of emission reductions over the entire crediting period of 10 years represents a reasonable estimation using the assumptions considered by the project participant. All the assumptions for this estimate either come from the assumptions used for investment analysis or based on official data sources in line with relevant EB guidelines. The assumptions used for investment analysis have been already validated in section 3.7.3 of this report. The validation team confirms that the estimates of baseline emissions can be replicated using the information provided. It also can be verified using the CER spreadsheet (Ref/40/) for calculations of emission reductions.

Based on the above assessment, the validation team hereby confirms that:

(a) All assumptions and data used by the project participants are listed in the PDD, including their references and sources;

(b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD;

(c) All values used in the PDD are considered reasonable in the context of the proposed CDM project activity;

(d) The baseline methodology has been applied correctly to calculate baseline emissions and emission reductions;

(e) All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

3.7 Additionality of a project activity (97)

The steps taken and sources of information used, to cross-check the information contained in the PDD on this matter are described below.

The steps taken by the validation team to assess the additionality of the Project Activity includes review of documents indicated in the assumptions in the financial analysis spreadsheet (Ref/39/). The detailed steps, including an assessment of how the documentation referred to in the PDD for the demonstration of additionality is appropriate, are described in Sections 3.7.1 through 3.7.5 below.

3.7.1 Prior consideration of the clean development mechanism (104)

The start date of the project activity is prior to 2nd August 2008. The EB 62 Annex 13 guidelines on the demonstration and assessment of the prior consideration of CDM (Ref/53/) require (paragraph 6) the project participant to demonstrate that CDM was seriously considered in the decision to implement the project activity. The steps taken by the validation team to validate the Prior Consideration of CDM are mentioned below.

The Project participant had entered into an agreement in June 2003 with M/s. Alstom Projects India Ltd. for supplies of O&M spares ex-works Alstom's India factory and for Engineering & Construction Services for the proposed project activity (Ref /17/). A review of Clause 5.4 of the agreement (Refer page 71 of 158) indicates that the project participant would issue a "Notice to proceed" to the EPC supplier and only then can the supplier proceed with the further course of action. Hence this "Notice to proceed" can be seen as de facto permission by the project participant to start the commencement of work. The validation team noted that the EPC agreement in itself did not mandate a commitment or any intention of the project participant to release funds for commencement of work for the project activity; rather it stated that any release of payments (either as advance payment or any other) to the EPC contractor would be based on the issuance of "Notice to proceed" issued by the project participant. The validation team verified the financial accounts of the project participant for the year 2003/04 and observed that the first financial commitment of the project participant for the proposed project activity was on 21/01/2004 which is after the date of notice to proceed viz., 14/01/2004.

The validation team confirmed that notice to proceed was issued on 14/01/2004 from the original documents provided by the project participant.

The Project participant had entered into an agreement in June 2003 with M/s. Alstom Projects India Ltd. for supplies of O&M spares ex-works Alstom's India factory and for Engineering & Construction Services (Ref/17/). The agreement contained provision for the project participant to issue a notice to proceed to the EPC contractor. In keeping with the same, such notice was issued to Alstom Projects India Ltd. on 14/01/2004. Similar notice was also issued on the same date to Alstom (Switzerland) Ltd. for supplies to be made to the project activity from Alstom's overseas works (Ref /17/).

The validation team confirmed that notice to proceed was issued on 14/01/2004 from the original documents provided by the project participant.

As per the terms of the agreement with Alstom, the notice to proceed is a confirmation to the EPC contractor from the project participant's side of the financial closure being achieved and signals the project participant's permission to commence work on the project activity. The date of such notice is the earliest date of real action taken by the project participant towards the start of the work and hence is acceptable as the start date of the project activity, as per the definition of the same provided in the CDM glossary of terms version 5 EB 47 (Ref/52/).

The validation team therefore is of the opinion that the date of notice to proceed issued by GVK Industries Ltd. (14.01.2004) to the EPC contractor Alstom is the "start date" of the project activity and is in line with its definition under the CDM Glossary of terms version 5, viz., "the earliest date at which either the implementation or construction or real action of a CDM project activity begins." The notice to proceed is the earliest such date and hence, is the start date. The same is also validated in detail under section 3.7.1 of the validation report. The start date is therefore correctly validated in line with the requirement of paragraph 104 (a) of the VVM.

Prior awareness of CDM:

The project participant was in discussion with their CDM consultants, Price Waterhouse Coopers (PwC) before the date of decision for the project activity and had held a meeting with PwC on 04/01/2003, during which the eligibility of the project activity for CDM was discussed in detail. Minutes of these discussions (Ref /61/) were provided to the validation team, wherein it was indicated that fuel switching from higher carbon intensive fuels like coal & naptha to natural gas results in lower CO2 emissions and hence is eligible to avail carbon credits under the Kyoto protocol. Based on the review of these minutes, the validation team confirms that the project participant had sufficient awareness of CDM prior to the date of decision.

The Board of Directors were also provided with a project note (Ref/9/) detailing the techno-commercial evaluation of the project activity. The note was prepared by GVK's internal technical team on 10th January 2003. It contains a reference to carbon credits and was an input for the decision making for the project activity. The reference to CDM in the project note is also an additional evidence of the project participant's awareness of CDM prior to the date of decision.

CDM as a decisive factor in decision making:

The formal decision to set up the project activity is recorded in the minutes of meeting of the Board of Directors of GVK Industries Ltd., held in Hyderabad on 28th February 2003. The project participant provided a certified extract (Ref/10/) of the Board resolution to the validation team. The team has also vetted this extract against the original resolution on file in the Board register maintained at the project participant's corporate office at Hyderabad. The contents of the extract were found to be a verbatim reproduction of the original. The extract of the Board resolution has a clear reference to CDM and it states that the levelised cost of generation of power with natural gas as fuel is more than the levelised cost of generation with coal, making the gas option less economically attractive than the coal option of power generation. Further, the extract also states that the Board has decided to set up the project activity as a natural gas based plant, taking into account the availability of carbon credits. The validation team therefore accepted that the CDM revenues have been a decisive factor behind the decision to set up the project activity.

The validation team raised CL-6 since the capacity of the project activity as stated in the Board decision of 28/02/2003 is 220 MW but the actual plant capacity, as confirmed from the EPC contract is 228 MW. The project participant clarified that though the capacity initially planned was 220 MW, the draft Power Purchase Agreement (PPA) signed between them and the APTRANSCO was for a capacity of 220 MW (Ref/11/). To deliver this power to the grid, a higher capacity would be required, in order to account for plant auxiliary power consumption and also some capacity degradation that could take place over the operating life time of the plant, it would be necessary for the actual installed capacity to be 228 MW.

The actual auxiliary consumption for a gas based power plant is confirmed from CERC tariff notification of 2001 to be @3 % of the total capacity, which comes to 6.6 MW. The installed capacity of 228 MW would therefore enable the Project Participant to sell 220 MW of power (net) to the grid, as per the terms of the PPA. The explanation provided by the Project Participant was therefore accepted.

The gross power output of the plant is also confirmed as 228 MW, from the EPC contract entered into with Alstom (Ref/17/). The validation team also noted that the financial analysis of levelised cost and IRR has been carried out by the Project Participant on the basis of 228 MW plant capacity. In the analysis, therefore, the energy generation considered is higher and this leads to a more conservative working of the financials. The clarification request raised on this issue [CL-6] was hence, closed.

Continuing and real actions taken:

A complete chronology of events starting from the date of investment decision up to the submission of the PDD to BVCH for the validation is presented in the PDD. The chronology illustrates the steps taken by the project participant to avail of CDM benefits for the project activity. Documentary references in respect of each event in the chronology were provided to the validation team. The documents provided were vetted against their originals and found to be true copies of the same.

The following documents were the basis on which the validation team was able to conclude that the CDM was seriously considered and the PP had taken the necessary steps to avail CDM status for the project activity:

Sr. No.	Document reviewed	Real action as per EB 62 Annex 13 guidance
1.	Extract of the minutes of meeting of the Board of Directors of GVK Industries Ltd. (Ref/10/)dated 28/02/2003	Decision to set up the project activity

2.	Notice to proceed issued by GVK Industries Ltd. to M/s. Alstom Projects India Ltd. and Alstom (Switzerland) Ltd., dated 14/01/2004 (Ref/16/)	Start date of the project activity
3.	Emission reduction purchase agreement signed between GVK Industries Ltd. and Rotec Industries, dated 11/02/2005 (Ref /62/)	Signing of the ERPA
4.	Memorandum of Understanding (MoU) signed by GVK Industries Ltd. with CDM consultants, CO2.ecom Limited, London dated 04/01/2007 (Ref/63/)	Appointment of the CDM consultant
5.	Minutes of meeting held with the local stakeholders at the site of the project activity on 01/12/2007 (Ref /36/)	Local stakeholder meeting
6.	Appointment of DOE (Bureau Veritas Certification) by GVK Industries Ltd. on 09/02/2008 (Ref/64/)	Appointment of the BVCH
7.	Commissioning of the project activity on 14/04/2009(Ref/6/)	Completion of project activity implementation

The trail of events in the chronology, along with the supporting documentary evidence indicates that the PP had taken necessary actions and steps towards the registration of the project activity as a CDM project. Also, these actions were taken in parallel with the implementation of the project activity, with the gap between documented evidences being less than 2 years, thus meeting the requirement of EB 62 Annex 13 Guidance(Ref/53/) pertaining to parallel action towards securing the CDM status for the project activity.

Based on the above assessment, BVCH hereby confirms that the proposed CDM project activity complies with the requirements of the latest version of the EB Guidance on prior consideration of CDM.

3.7.1.1 Historical information on project timeline

The Project Participant has been operating a power plant at the Jegurupadu site since 1996-97. The capacity of this plant is 216 MW. This plant was set up with naphtha as the primary fuel. GVK Industries Ltd. had also applied for permission from the Government of Andhra Pradesh to expand this capacity by adding another 240 MW; however, the actual expansion had to await release of gas allocation from the Ministry of Petroleum & Natural Gas (MoP&NG).

GVK Industries had also obtained environmental clearance form the Ministry of Environments & Forests (MoEF) on 24/06/1997 for the proposed expansion project (Ref /65/).

The Government of Andhra Pradesh accepted GVK's proposal for the capacity expansion in January 1998 on the condition that the Power Purchase Agreement (PPA) be governed by the same terms and conditions as for other short gestation projects that were being set up at that time. GVK Industries agreed to this but requested the Government of Andhra Pradesh to allow it to enhance the capacity of the planned expansion from 240 MW to 360 MW, as one of the short gestation projects at that time had the same capacity. The Government of Andhra Pradesh agreed to this but clarified that obtaining fuel (i.e. natural gas) for the expanded capacity would remain the project developer's (i.e. GVK's) responsibility.

In July 1999, the Ministry of Petroleum & Natural Gas allocated 1.1 mcmd (million cubic metres per day) quantity of natural gas for the expansion of capacity.

In the year 2000, the Government of Andhra Pradesh recommended that the capacity expansion of 360 MW be executed in two stages: the first stage with the quantity of gas already allocated by MoP & NG and the second stage after the allocation of additional quantity of gas. GVK proposed to the Government that the capacity be further enhanced from 360 MW to 440 MW and the same would be executed in two stages. Stage I of 220 MW would be set up with the gas allocation of 1.1 mcmd and the stage II of 220 MW after the allocation of the balance quantity of gas that would be required for the purpose.

Consent to establish the gas based plant was accorded to GVK Industries by the Andhra Pradesh Pollution Control Board (APPCB) on 20/04/2000.

A draft PPA was signed between the Transmission Corporation of Andhra Pradesh Ltd. (APTRANSCO) and GVK Industries on 30/11/2001 (Ref/11/). The draft PPA stipulated the stage I plant capacity to be 220 MW and the primary fuel to be natural gas.

A public hearing on tariffs for the power generated by the gas based plant of GVK (i.e. 220 MW) was conducted by the Andhra Pradesh Electricity Regulatory Commission (APERC) on 19/12/2002.

The validation team has observed the series of historical events described as above, that preceded the Project Participant's decision of 28/02/2003, to set up the project activity. The evidences used to confirm the same are as follows:

1. APERC's order O.P.No. 4/2002 dated 12/04/2003 in which the chronology of events has been detailed (Ref/13/)

2. Draft PPA signed between the Project Participant and APTRANSCO on 30/11/ 2001 (Ref/11/)

In view of the historical timeline that preceded the date of decision (28/02/2003) of the Project Participant, which indicates that the expansion of capacity at the Jegurupadu site was being planned for a number of years, the validation team raised a clarification request [CL-11], requesting the Project Participant to explain and justify the date of decision presented in the PDD, viz., 28/02/2003.

The Project Participant, in their response has justified in detail the date of decision of 28th February 2003 and not prior to that. The validation team observed that various events taken that have taken place prior to 28/02/2003 such as allocation of gas by MoP & NG, environmental clearances issued by the MoEF, consents from the State Pollution Control Board, public hearings, etc. are intermediate events that took place in the course of planning of the capacity expansion. Although the environmental clearance was obtained in 1997 itself, the same was for a naptha based power plant. The project activity on the other hand, uses natural gas as the main fuel. Other milestones such as the allocation of gas for the expansion, regulatory clearance from the state pollution control Board had also been achieved during the planning stages of the project activity, but these could be regarded as essential pre-requisites without which no final decision by the Project Participant could be effected. As the project activity was also expected to secure debt funding, obtaining the environmental clearance/consents, various permissions, approvals for Government authorities and securing the fuel linkage would also become mandatory requirements for the Project Participant to achieve financial closure, without which there could be no progress on setting up the project activity.

Further, the draft PPA with APTRANSCO was signed only on 30/11/2001. Thus, the operating framework for the project activity in terms of the terms and conditions of sale of power to the purchasing entity, viz., APTRANSCO were available to the Project Participant only by 30/11/2001. The commercial terms and conditions of operation would form one of the important inputs in the decision making process and hence, the team noted that it would not be feasible for the Project Participant to reach their decision without such key inputs in place.

The validation team therefore accepted the Project Participant's justification of the date of decision and the clarification request was closed.

3.7.2 Identification of alternatives (107)

The project participant has identified all the realistic and credible alternatives to the project activity in the section B.4 of the PDD. The consideration of the selected alternatives was validated by BVCH and a detailed assessment of the same is provided in section 3.6.3 of this report.

i) The list of alternatives considered in the PDD includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity

ii) The alternatives considered are regarded as plausible by the validation team on the basis of its local and sectoral knowledge and experience

iii) Each of the alternatives complies with national and local legislation of the host country.

Hence, BVCH considers the listed alternatives to be credible and complete.

3.7.3 Investment analysis (114)

The project participant has used the levelised cost approach to analyse the identified alternatives to determine the baseline. With this approach, the levelised cost for each of the following alternatives was calculated:

Alternative I: Power generation using natural gas as the fuel (project activity without CDM)

Alternative II: Power generation using coal as the fuel in a conventional sub-critical technology power plant.

These were the only two alternatives that remained in consideration for the determination of the baseline, as explained in section 3.6.3 & 3.7.2 above.

The levelised cost calculated for these two alternatives was based on assumptions of input parameters as detailed in the table below. The sources of information and means of cross-check used for each of the values are also provided in the right hand column of the table.

Alternative I: Power generation using natural gas

Sr. No.	Input parameter	Value of the parameter	Validation assessment	
			Information source referred to and its appropriateness	Information source used for Cross-checking
PROJECT INVESTMENT RELATED				

1.	Project capacity	228 MW	The plant capacity is recorded in GVK Industries Ltd Board resolution extract dated 28/02/2003 as 220 MW. The EPC contract dated June 2003 signed by the PP with Alstom (Switzerland) Ltd. confirms the capacity to be 228 MW (Please refer to CAR-1)	Name plate capacities of the Gas Turbine Generator (GTG) and Steam Turbine Generator (STG) which indicate the rated capacities of the generating equipment under ISO conditions. The contractual guarantee from EPC contractor Alstom also states the same capacity of 228 MW.
2.	Expected Date of financial closure	**01/12/2003**	The date is taken from Project Note dated 10/01/2003 that was submitted to GVK's Board of Directors prior to the date of decision, wherein the proposed date of financial closure is stated as 01.12.2003 and is hence appropriate (Ref /9/)	The common loan agreement (Ref/33/) entered into by the project participant with a consortium of lenders to the project activity is dated 20/11/2003. This was verified by the validation team. The date of the common loan agreement marks the availability of funding for the project activity and is therefore the actual date of financial closure.
3.	Planned construction period	22 months	The period is assumed from Project Note dated 10/01/2003 that was submitted to GVK's Board of Directors prior to the date of decision and is hence appropriate	The EPC contract dated June 2003 between GVK Industries and Alstom stipulates the same period for project completion.
4.	Expected Project commissioning date	01/10/2005	The date is taken from Project Note dated 10/01/2003 that was submitted to GVK's Board of Directors prior to the date of decision and is hence appropriate	From the letter dated 13.05.2009 issued by Andhra Pradesh Power Co-ordination Committee to GVK Industries, the actual date of commercial

				operation of the project activity is reckoned as 14.04.2009. The project activity was commissioned after a long delay in its implementation (Ref/6/).
5.	Project cost	IN` 7251.60 million	The total project cost is stated in IDBI Bank's detailed appraisal memorandum provide to GVK by IDBI Bank along with their letter of intent for loan sanction dated 4th May 2001 (Ref /12/). The appraisal memo is IDBI Bank's own assessment of the project commercial aspects. Total project cost stated in the appraisal memorandum is IN` 7600 million, which is in fact slightly higher than the project cost assumed in the financial analysis. As the appraisal has been carried out independently by IDBI Bank for the project activity, the estimate of project cost made therein is considered by the validation team to be a reliable estimate. [Please refer to note below on "Project cost"]	1) The draft Power Purchase Agreement (PPA) dated 30/11/2001 signed between the Transmission Corporation of Andhra Pradesh Limited (APTRANSCO) and the project participant GVK Industries(Ref/11/) had also projected a capital cost of IN`760 crores (i.e. IN`.7600 million). 2) The EPC contractor Alstom had provided a quotation to the project participant GVK Industries (dated 07/03/2001) in which the combined on-shore and off-shore elements of the project cost were stated as IN` 4989 million. The corresponding estimate of these components in the financial analysis of levelised cost is IN` 4907 million, which is lower than the original quotation from Alstom. The remaining components of the project cost, viz., land

				cost, civil works, construction supervision & start-up expenses, engineering & consultancy fees, legal expenses, operator training costs and Interest during construction (IDC) and financing costs, etc., adding up to IN` 2344.48 million were estimates drawn up by the project participant on the basis of their experience in setting up the pre-existing Phase I gas power plant (216 MW). The estimates were presented to GVK's Board of Directors in the form of a project note dated 10/01/2003 and the same was referred to by the Board in their decision to invest in the gas based power plant.
6.	Debt : equity ratio	100% debt	The project participant had initially approached the IDBI Bank with a request for loan approval. IDBI Bank issued their letter of intent (LoI) along with a detailed appraisal memorandum for the project activity. The appraisal memorandum has stated the amount of loan assistance to the extent of IN`3000 million (Rupee + foreign currency loan) and in addition an underwriting of debt of IN`4600 million. The total assistance of IN` 7600	The validation team has cross-checked from the common loan agreement (Ref/33/) signed by the project participant with a lender consortium on 20/11/2003, that the amount funded is IN`.7203.66 million which includes the foreign currency component as well. This is the entire project cost assumed by the project participant. Hence, it is confirmed that the

			million required is therefore, in the form of debt alone, as per the appraisal memorandum. The validation team therefore agrees that the 100% debt considered in the financial analysis is an appropriate assumption and is related to the project participant's plans for funding the project activity solely through debt.	project is funded through a 100% debt pattern
7.	Life of the plant	15 years	As per the schedule contained in the depreciation norms for generating companies in the Gazette of India Extraordinary published by the Ministry Of Power India and dated 29/03/1994. Since the Gazette of India is an official publication of the Government of India, the data published in the same can be considered as authentic (Ref/66/).	The Appendix –II of the CERC tariff regulations (Ref/56/) dated 26/03/2001, which gives the depreciation schedule for various categories of power plants, has also indicated the lifetime of gas based plants to be 15 years.
OPERATIONS RELATED				
8.	Plant Load Factor of the plant (PLF)	85%	The draft Power Purchase Agreement (PPA) dated 30/11/2001 signed between APTRANSCO and GVK Industries has considered a PLF of 80% (Clause 3.1 & 3.2). The PLF of 85% considered in the project financials is hence a more conservative assumption. [Please refer to note below on "Plant Load Factor"]. The draft PPA was available to the project participant prior to	The validation team has referred to a certificate provided by an independent Chartered Engineer (Ref/23/). The same is based on log sheets and plant records. The PLF is certified to be 90.34% for the first year and 81.75% for the second year of the plant operation. The PLF for the first year is higher as there was no maintenance work

			the date of investment decision and also formed the basis for the decision that was subsequently taken. Moreover, the value of PLF (85%) is conservative. Hence, the same was accepted.	carried out during the first year. However, the sensitivity analysis on the PLF value in the investment analysis is done considering a range of ±10% which covers this PLF variation.
9.	Minimum PLF to prevent disincentive	68.5%	The draft PPA dated 30/11/2001 indicates the minimum PLF that must be achieved by the plant in order to avoid the levy of penalties (clause 3.6). The draft PPA was available to the project participant prior to the date of investment decision and also formed the basis for the decision that was subsequently taken. Hence, the value assumed was accepted by the team.	The same value (68.5%) of minimum PLF is also stated in the firm PPA that was signed between APTRANSCO and GVK on 18/06/2003(Ref/24/).
10.	Foreign debt service charge	0.006 US $/kWh	The draft PPA dated 30/11/2001 indicates this value of foreign debt service charge as an element in the computation of capacity charge payable by APTRANSCO to GVK (Clause 3.2 of the draft PPA). The draft PPA was available to the project participant prior to the date of investment decision and also formed the basis for the decision that was subsequently taken. Hence, the value assumed was accepted by the team.	The value of foreign debt service charge in the firm PPA signed on 18/06/2003 between APTRANSCO and GVK is the same as in the draft PPA signed earlier.
11.	Other fixed charges (on the	0.669 IN`/kWh	The draft PPA dated 30/11/2001 indicates this	The value of other fixed charges in the

	basis of 80% PLF of the plant)		value of other fixed charges as an element in the computation of capacity charge payable by APTRANSCO to GVK (clause 3.2 of the draft PPA). The draft PPA was available to the project participant prior to the date of investment decision and also formed the basis for the decision that was subsequently taken. Hence, the value assumed was accepted by the team.	firm PPA signed on 18/06/2003 between APTRANSCO and GVK is the same as that in the draft PPA signed earlier
12.	Incentive payment (for PLF of 80% and more)	0.0669 IN` /kWh	The draft PPA dated 30/11/2001 indicates this value of incentives payable by APTRANSCO to GVK (Clause 3.2 of the draft PPA). The draft PPA was available to the project participant prior to the date of investment decision and also formed the basis for the decision that was subsequently taken. Hence, the value assumed was accepted by the team.	The incentive structure in the firm PPA signed on 18/06/2003 between APTRANSCO and GVK was changed and is not the same as in the draft PPA. However, the validation team has confirmed that the incentive offered to GVK in the draft PPA is much higher than the actual incentive that could be expected during the course of operation of the plant. As the incentive assumed in the financial analysis is more conservative (being higher) the validation team accepted the same.
13.	Rebate	2.5%	The rebate (for prompt payment of bills raised on the power purchaser) applicable was specified in the draft PPA signed on 30/11/2001 between APTRANSCO and GVK	The firm PPA signed by GVK Industries Ltd with APTRANSCO on 18/06/2003 also has specified the same value in clause 5.11 (Rebates & late

			(Clause 5.11 of the draft PPA). The draft PPA was available to the project participant prior to the date of investment decision and also formed the basis for the decision that was subsequently taken. Hence, the value of rebate assumed was accepted by the team.	charges)
14.	Auxiliary consumption	3%	The assumption of auxiliary consumption is taken from CERC tariff notification which is dated 26/03/2001. This notification was available to the project participant prior to the date of decision. Since the CERC is a regulatory authority, the data derived from the same is regarded as authentic and hence was accepted by the validation team. The CERC notification is also available in the public domain.	An independent Chartered engineer P.V. Rajeswar Rao has certified actual plant data over the years 2009 & 2010 after the plant was commissioned (Ref/23/). The actual auxiliary consumption was 1.63% for 2009-10 and 1.95% for 2010-11. The actual consumption is slightly less than assumed. However, even with a lower value of auxiliary consumption, it is observed by the validation team that the computed levelised cost per kWh and the project IRR do not undergo any material change. This was confirmed by putting the actual value of auxiliary consumption in the financial spreadsheets and checking the results.
15.	Operations & Maintenance (O&M) cost including insurance cost	4%	The O&M cost is assumed on the basis of previous annual reports for the years 1999-2000, 2000-2001, 2001-02 and 2002-	The validation team has cross-checked O&M cost assumed by the Project Participant by referring to CERC

			03 for the phase – I gas based power plant (of 216 MW capacity) that was in operation even at the time of the decision for the project activity. The O&M cost is stated in these annual reports. The annual reports are certified by a Chartered Accountant and hence are regarded as authentic documents by the validation team. Also, the data pertains to GVK's own gas based plant which was in operation and of equivalent capacity (216 MW), hence is comparable to the project activity.	regulations of tariff dated 26/03/2004. The O&M cost stated in the same is IN` 0.78 million per MW. As the project capacity is 228 MW, the total O& M cost would be IN` 177.84 million. The project cost is IN` 7251 million; hence, the O&M as a percentage of the total project cost is 2.5%, which is lower than the assumption. In the financial model for levelised cost and project IRR, however, the O&M cost has been subjected to a variation of 10% for sensitivity analysis and there is no change in the overall results.
16.	Escalation in O&M cost	6% per annum	The rate of escalation in the O&M cost considered is based on CERC tariff notification 2001 (Ref/56/), which is a document published by the regulatory authority and available in the public domain. The tariff notification is dated 26/03/2001 and hence was available to the project participant prior to the date of decision.	CERC regulations dated 26/03/2004 state the escalation in O&M cost to be 4%. However, even with a lower value of escalation considered, there is no material change in the results of the financial analysis. The Project Participant submitted the spreadsheets for levelised cost and project IRR with an escalation of only 4% and the corresponding results of the analysis were checked by the validation team.
ENERGY RELATED				

17.	Station heat rate of the power plant	1850 kcal/kWh	The value is taken from draft PPA signed by GVK Industries with APTRANSCO on 30/11/2001, in which the station heat rate is specified as Item No.57 of Article 1. The station heat rate for the first year is stipulated by APTRANSCO to be 2682.5 kcal/kWh up to the date of completion of the project/date of commercial operation and 1850 kcal/kWh from the date of completion of the project/commercial date of operation onwards. The draft PPA is a document available at the time of decision and being a draft agreement for sale of power generated by the plant with APTRANSCO (which is the purchaser), the value of station heat rate stated in the same is accepted by the validation team as a valid assumption.	Station heat rate was confirmed from CERC terms and conditions of tariff dated 01/04/2004. The station heat rate is specified in the CERC order on page 25, as 1850 kcal/kWh for combined cycle operation plants. The same value is also taken by the Project Participant for the plant's commercial operation.
18.	Fuel cost (NG)	IN` 4200 per 1000 SCM	The gas supply bill for the existing phase-I gas based power plant with PP in January shows price of IN` 3,810 per 1,000 SCM. This was based on the APM (Administered Price Mechanism) pricing policy set much before the investment decision. Before the investment decision, APTRANSCO had filed a petition (Ref/14/) with APERC (Andhra Pradesh	The IDBI Bank's detailed appraisal memorandum of the project sent to the project participant along with their letter of intent for loan sanction letter dated 4/05/2001. The appraisal memorandum also states the price of natural gas to be IN`4200 per 1000 SCM. The appraisal memo is IDBI Bank's own

			Electricity Regulatory Commission) (on 28/01/2003) with supporting reasons, to allow for tariff increase due to rise in the gas prices. The basic calculation on pg. 9 of the petition filed by APTRANSCO before APERC has shown that at that time ongoing APM price of gas was IN` 2850 per 1000 SCM. This was taken as the base price. After including the cost of transportation and taxes, delivered cost would be IN`4000 per 1000 SCM. The same APERC order on page 9 has gone further to estimate gas prices at even higher levels of IN` 5600 and above, from sources not coming under the jurisdiction of the APM. Thus, considering a mix of APM gas and non-APM gas, the price was estimated at IN` 4200 per SCM by the PP for its investment decision. This price is also found in the Project Note to the Board of Directors in January 2003.	assessment of the project commercial aspects. The validation team also referred to an article published in a leading financial daily (The Financial Express dated 19.04.2002). The article also states the base price of natural gas to be IN` 2850 per 1000 SCM. This is the same price as stated in IDBI Bank's appraisal memorandum. The actual price of gas delivered to the project activity as on the date of commercial operation of the plant (C.O.D.) was checked by the validation team and the price was IN`6703 per 1000 SCM
19.	Gross calorific value (G.C.V.) of the fuel (NG)	10000 kcal/SCM	The G.C.V. is mentioned in the fuel supply agreement dated 05/10/1999 between GAIL (Gas Authority of India Ltd.) and GVK Industries Ltd. The value of GCV is a physical parameter and has been specified through the fuel supply	The letter dated 8/07/1999 issued by the Ministry of Petroleum & Natural Gas, Government of India to GVK Industries Ltd. confirms the allocation of 1.1 mmscd of gas for the Phase-II expansion

			agreement already available to the project participant as a source of information, prior to the date of decision. Hence, the assumption was accepted by the validation team.	project of GVK. Appendix 11 of this letter provides an analysis of the natural gas that would be allocated, in which the gross calorific value was specified as 38267 kJ/sm^3. This converts to 9154 kcal/SCM. The validation team notes that this value is lower than the project participant's assumption in the financial analysis and hence, the assumed value of GCV is justified, since it is higher and more conservative than the actual expected GCV.
FINANCING RELATED				
20.	Interest rate (IN`)	10.75%	The interest rate assumed is the Reserve Bank of India specified Prime Lending Rate (PLR) for Indian banks. As on the date of the Project Participant's investment decision, this rate as confirmed from the Reserve Bank of India's official web site http://rbidocs.rbi.org.in was 10.75% and the same is taken for the financial analysis. The RBI PLR was applicable on the date of the Project Participant's investment decision and is hence, acceptable as a source of information for determining the rate of interest.	As the rate assumed is drawn form the official web site of the Reserve Bank of India, there is no further need to cross-check the rate. The validation team has however, checked the actual rate at which the loan was drawn by the Project Participant from its bankers. The actual lending rates of the consortium of banks in the Common Loan Agreement signed by the Project Participant with its lenders are 1.5% to 1.6% below the individual PLRs of each lending bank. As the actual interest

				rates are lower, the validation team requested the Project Participant to again re-work the financial analysis with the actual interest rates. However, the difference between actual interest rates and the assumed rate have not made any material impact on the results of the analysis.
21.	Interest rate (US $)	4.8%	The interest rate on the foreign currency loan is specified in the detailed appraisal memorandum of IDBI Bank sent to GVK along with IDBI's letter of intent for loan sanction dated 4th May 2001. The rate of interest is specified as LIBOR + 3.5% for US $ loan. Prior to the date of the investment decision, the LIBOR stood at 1.3%. The Project Participant has assumed this value from the internet web site www.wsjprimerate.us. Hence, the US $ loan interest rate comes to 1.3% + 3.5% = 4.8%. The US $ loan interest rate is based on LIBOR prevailing at the time of the investment decision and is hence acceptable as a source of information for determining the rate of interest.	The validation team has cross-checked the LIBOR from the web site http://www.global-rates.com/interest-rates/libor/american-dollar/2003.aspx The historical LIBOR rates are available on this web reference and the rate was 1.3% for February 2003.
22.	Loan portion (US $)	30%	The proportion of foreign currency loan (FCL) was assumed by the project participant in the financial analysis submitted to the	The subsequent common loan agreement dated 20/11/2003, between GVK Industries Ltd.

			validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis.	and a syndicate of 11 lenders for the project activity indicates that the actual proportion of the FCL in the total loan for the project activity was 32% which is very close to the assumption made.
23.	Loan portion (IN`)	70%	The proportion of the Rupee currency loan was assumed by the project participant in the financial analysis submitted to the validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis.	The subsequent common loan agreement dated 20/11/2003, between GVK Industries Ltd. and a syndicate of 11 lenders for the project activity indicates that the actual proportion of the Indian currency loan in the total loan for the project activity was 68%, which is very close to the assumption made.
24.	IN (`) loan repayment period	10 years	The loan repayment period was taken as an assumption by the project participant in the financial analysis submitted to the validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis. The team confirms from its experience that lenders normally stipulate 10 years to be the repayment period for medium term loans for infrastructure projects.	The common loan agreement dated 20/11/2003, signed between GVK Industries Ltd and a syndicate of 11 lenders also specifies (Schedule XII of the agreement) that the repayment period for the Rupee term loan is 10 years.
25.	US $ loan repayment period	10 years	The loan repayment period was taken as an assumption by the project participant in the financial	The common loan agreement dated 20/11/2003, signed between GVK

			analysis submitted to the validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis. The team confirms from its experience that lenders normally stipulate 10 years to be the repayment period for medium term loans for infrastructure projects.	Industries Ltd and a syndicate of 11 lenders also specifies (Schedule XII of the agreement) that the repayment period for the Foreign currency loan is 10 years.
26.	Moratorium for IN (`)loan	1 year	The moratorium was assumed to be for a period of one year from the date of loan disbursement. This is a normative assumption made by the project participant. As the loan disbursement was expected to take place in a staggered manner from the date of sanction of the loan, a period of one year as a moratorium is regarded by the validation team to be an acceptable assumption.	As per the Common Loan Agreement (Ref/33/) dated 20/11/2003, signed by the Project Participant with a consortium of lenders to the project activity, the repayment schedule for the Rupee loan component is stipulated by the loan agreement to start from 15/03/2006. As per the same agreement, the last instalment of loan drawdown is the 22nd month from the date of financial closure (01/12/2003), which is October 2005. The effective moratorium thus available to the Project Participant is therefore about six months, which is less than the one year period assumed for the investment analysis. A higher moratorium will however make the investment analysis more conservative, as

				the levelised cost worked out will be lower and the project IRR also will be higher.
27.	Moratorium for US $ loan	1 year	The moratorium was assumed to be for a period of one year from the date of loan disbursement. This is a normative assumption made by the project participant. As the loan disbursement was expected to take place in a staggered manner from the date of sanction of the loan, a period of one year as a moratorium is regarded by the validation team to be an acceptable assumption.	As per the Common Loan Agreement (Ref/33/) dated 20/11/2003, signed by the Project Participant with a consortium of lenders to the project activity, the repayment schedule for the US dollar loan component is stipulated by the loan agreement to start from 15/03/2006. As per the same agreement, the last instalment of loan drawdown is the 11th month from the date of financial closure (01/12/2003), which is October 2005. The effective moratorium thus available to the Project Participant is therefore about one year, which is the same as assumed in the financial analysis.
28.	Currency Exchange rate IN`/US $	IN`47.66	This is the currency exchange rate that was prevailing at the time of the investment decision made. The same is confirmed from the web-site http://www.x-rates.com/d/INR/USD/hist2002.html (exchange rate prevailing on 27/02/2003), which can be regarded as an authentic source of information on cross-currency exchange rates.	The Weekly supplement published by the Reserve Bank of India on its official web site www.rbidocs.org.in has provided the currency exchange rates for various currencies. The rates published for Feb 22nd, 2003 are the closest to the date of investment decision of the Project Participant ie, 28/02/2003. The US

				$/IN` conversion rate on that day was 47.79. The exchange rates fluctuate daily. However, the rate published by RBI is a cross-check for the rate assumed by Project Participant in the financial analysis.
29.	Discounting rate	10.75%	The rate of discounting assumed corresponds to the Prime Lending Rate (PLR) stipulated by the Reserve Bank of India (RBI). The rate applicable at the time of the investment decision has been taken. The same was confirmed by the validation team from RBI's official web site http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/34625.pdf. As the PLR is specified by RBI in the form of a range, the project participant has assumed the average of the minimum and maximum PLR that were applicable at the time of the investment decision.	As the discounting rate assumed is taken from the Reserve Bank of India's official web site, the same is regarded as valid by the validation team without further need to cross-check.
WORKING CAPITAL RELATED				
30.	Working capital interest rate	10.75%	The interest rate assumed is the Reserve Bank of India specified Prime Lending Rate (PLR) for Indian banks. As on the date of the Project Participant's investment decision, this rate as confirmed from the Reserve Bank of India's official web site http://rbidocs.rbi.org.in was 10.75% and the same is taken for the	The working capital limits for the phase-I project of the project participant (viz, the pre-existing gas based plant of 216MW) were sanctioned by State Bank of India vide its loan sanction letter (Ref /34/) dated 23/08/2002. The rate of interest mentioned in that letter was 13.25%. Hence, the

			financial analysis. The RBI PLR was applicable on the date of the Project Participant's investment decision and is hence, acceptable as a source of information for determining the rate of interest.	assumption of 10.75% is more conservative.
31.	Working capital loan	75%	This is the margin amount out of the total working capital requirement that is financed by Banks in India. Hence, the same was accepted by the validation team.	The working capital margin was also cross-checked from State Bank of India's letter (Ref/34/) dated 23/08/2002 in which the margin is stated as 25%.
TAX & DEPRECIATION RELATED				
32.	Income Tax Rate	35%	As per the prevailing rates under the Income Tax Act 1961 amended by the Finance Act of 2002	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)
33.	Minimum Alternate Tax	7.5%	As per the prevailing rates under the Income Tax Act 1961 amended by the Finance Act of 2002	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)

34.	Surcharge	5%	As per the prevailing rates under the Income Tax Act 1961 amended by the Finance Act of 2002	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)
35.	Rate of depreciation on building	3.34%	As per the Schedule XIV of the Companies Act 1956	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)
36.	Rate of depreciation on plant & machinery	5.28%	As per the Schedule XIV of the Companies Act 1956	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)

37.	Salvage value	IN`.1526 million	The salvage value considered is the book value of the plant calculated on the basis of straight line depreciation (SLM) method at the end of the 15th year of plant operation. The value assumed is 20% of the original plant value. As per the Schedule XIV of the Companies Act 1956, the salvage value is required to be taken @10% of the original value. Hence, the value assumed for the analysis is conservative.	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)

Project capacity:

The project activity was initially decided to be set up as a 220 MW gas based power plant. This is seen from the extract of the Board resolution of GVK Industries Limited dated 28/02/2003. The capacity of the plant stated in the web hosted PDD was also stated as 220 MW and the financials presented in the web hosted PDD were also based on a capacity of 220 MW. However, during the validation it was known that the actual capacity of the plant that was set up was 228 MW (also confirmed at the time of the site visit). The revised PDD and financials were later re-presented to the validation team on the basis of the plant capacity of 228 MW in response to CAR-1 raised by the validation team.

The validation team observed that although the initial decision was to set up a 220 MW capacity plant, the gross generation capacity was needed to be 228 MW in order to meet the commitment of supplying 220 MW after accounting for the auxiliary consumption of the power plant and also the station heat degradation likely to take place over the plant life time. As the corrections to the plant capacity were effected in the revised PDD and the revised financials also were worked out with 228 MW as the capacity, the CAR raised was closed.

Plant Load Factor:

In the draft PPA signed between APTRANSCO and GVK Industries, the capacity charges (which are a combination of the Foreign Debt Service charges and the other fixed charges) payable by APTRANSCO to GVK are based on the cumulative available energy generated by the power plant. The draft PPA considers PLF of 80% for the cumulative energy generation.

Fuel cost (Natural Gas):
It was observed by the validation team that at the time of the project participant's decision to invest in the gas based power plant, phase-I facility of 216 MW was already in operation at the same site in Jegurupadu, Andhra Pradesh. The team referred to a letter received by GVK Industries from GAIL (Gas Authority of India Ltd.) dated 10/03/2003 (Ref/22/) and from this letter, it is confirmed that the gas supplied to the Jegurupadu plant was originating from ONGC's (Oil & Natural Gas Commission) gas fields in the Krishna-Godavari (KG) basin and thus the new plant (i.e. Phase-II of 228 MW capacity also would receive gas from the same source. [The source of gas is also confirmed from the amendment (dated 30/01/2003) to the fuel supply agreement (of 510/1999) between GAIL and GVK Industries Ltd (Ref/18/)]. The fuel price assumed in the financial analysis, viz., IN` 4200 per 1000 SCM was cross-checked by the team against the price mentioned in GAIL's letter referred to above. The gas price in GAIL's letter is stated as IN` 5600 per 1000 SCM, which is substantially higher than the price assumed by the project participant (IN` 4200 per SCM) to demonstrate the financial analysis.

Gross calorific value:

GVK Industries Ltd. has entered into gas supply agreements with two suppliers: GAIL and Reliance Industries Ltd. The agreement with GAIL was signed on 5th October 1999 (Ref/18/) and with Reliance Industries Ltd. at a later date on 17/04/2009(Ref/21/). The validation team has also referred to the actual fuel invoices raised for gas supply from Reliance Industries Ltd. to the power plant of GVK Industries Ltd for the period from 1st May 2009 to 31st May 2009. The annexure to these gas sales invoices has indicated the NCV of the gas supplied to be in the range of 32100 Btu/SCM to 32124 Btu/SCM. This is equivalent to 8089-8095 kcal/SCM. The corresponding GCV would therefore come to 8986-8978 kcal/SCM.

The validation team also referred to a recent invoice (Ref /42/) dated 16/06/2011of GAIL for gas supply to the GVK plant. The GCV mentioned in this invoice is 9859 kcal/SCM.

Therefore, it is seen that the GCV for actual gas supply to the plant during the course of its operation is lower than the assumption of 10000 kcal/SCM made in the financial analysis. A higher value of GCV assumed leads to correspondingly lower value of the levelised cost of generation for natural gas based power generation, thereby making the analysis more conservative. Hence, this assumption was accepted by the validation team.

Debt-Equity ratio:
The Project Participant was already operating a gas based power plant adjacent to the project activity. Extract from the common loan agreement (between GVK Industries Ltd. & ICICI Bank Limited (Ref/33/), for the project activity plant states (Article 10 of the agreement) that some revenues from the pre-existing plant were also mortgaged to the lenders of the project activity plant, as one of the conditions for the funding of the project. The consortium of financial institutions has funded the project activity through 100% debt. But this was only after they had assured themselves of adequate security by way of mortgage of partial revenues from the pre-existing plant. The funding of power sector projects by securing the pre-existing assets of the borrower is a normal business practice and is also commonly observed in various other infrastructure projects within the country.

Loan interest rates:

The assumption of loan interest rate for Rupee term loan in the financial analysis is based on the RBI PLR that prevailed at the time of the investment decision in February 2003. The RBI PLR is the base rate of interest charged by banks to borrowers with an exceptional credit history and track record. This rate is therefore lower than market rates of interest. A lower rate of interest would result in a lower cost of generation (COG) calculated for the natural gas alternative, thus making the financial analysis more conservative with respect to the baseline of coal based generation. Hence, the validation team accepted the rate of interest assumed as 10.75%.

However, from the common loan agreement dated 20/11/2003, signed between GVK Industries and a syndicate of 11 lenders(Ref/33/), it was observed that the actual interest rates chargeable for the project would be 9.90 % to 9.92% for Rupee Term Loans. Since the actual interest rates are even lower than the assumed rate of 10.75%, a sensitivity analysis of the levelised cost of generation (COG) was also carried out, covering the actual rates chargeable. A similar exercise was also carried out for the levelised cost analysis for coal based power generation. The COG for coal and gas are presented in the table below under sensitivity analysis and the results indicate that gas based generation was still a costlier option compared to coal. Hence, the lower interest rates actually charged would not have any effect on the baseline which would remain as coal.

Project revenues:
The revenue model for the project activity is based on a two part tariff structure by way of which the power purchasing entity APTRANSCO compensates the Project Participant in terms of the

a) Energy charges and the
b) Fixed charges, explained as below.

a) Energy charges: this is the component of the tariff structure that is equal to the actual cost incurred by the Project Participant towards the fuel (natural gas) consumed for power generation. The quantity of fuel is worked out on the basis of the number of actual units of electricity exported by the plant, the station heat rate of the plant and the Gross Calorific Value (GCV) of the gas used. The electricity generated by the plant and the quantity of gas consumed are listed as monitored parameters under the monitoring plan in section B.7.1 of the PDD. Station heat rate is an ex-ante determined parameter (1850 kcal/kWh), validated and justified in the table above. The cost of fuel includes the cost of the gas plus the gas transportation cost, as billed by the gas suppliers Reliance & Niko and the transportation agencies GAIL (Gas Authority of India Ltd.) & RGTIL (Reliance Gas Transportation Infrastructure Ltd.).

b) Capacity charges : this is the total of the following charges billed by the Project Participant

1. Other Fixed charges : fixed @ IN` 0.669 per kWh and
2. Foreign Debt Service charges : fixed @ USD 0.006 per kWh

These charges are on the basis of the actual generation by the plant in kWh. The rates are fixed as per the clause no. 3.2 of Article 3 of the Draft PPA signed by the Project Participant with APTRANSCO

In addition to these charges, the Project activity is also eligible to receive incentives for power generation at PLF exceeding 80%. The quantum of incentive is specified under clause 3.7 of Article 3 of the Draft PPA. However, the incentives will apply only if conditions exist to enable the export of power to the grid. These conditions are influenced by the power supply scenario and the dispatch from individual power plants based upon the relative merits i.e. cost of power produced by such plants.

The revenue model was confirmed by the validation team by referring to the actual invoices (Ref/44/) raised by GVK Industries Ltd. during the operation of the plant.

Alternative II: Power generation using coal

Sr. No.	Input parameter	Value of the parameter	Validation assessment	
			Information source referred to and its appropriateness	**Information source used for Cross-checking**
PROJECT INVESTMENT RELATED				
1.	Project capacity	250 MW	The nearest coal based power plant that can provide an output comparable to the project activity plant was determined by the Project Participant as follows : Gas plant: 228 MW with auxiliary consumption of 3% operating at a PLF of 85% will provide an output of 1646 GWh. To realise the same output from a coal based plant, operating at the same PLF of 85%, the capacity will have to be 243 MW. This is because the auxiliary consumption of a coal plant is higher, at 9%, whereas that of a gas plant is only 3%. The Project Participant	The validation team cross-checked the capacity of coal based power plant assumed from the Report of the Committee to recommend the next higher sizes of coal fired thermal power stations. The said committee was set up by the Central Electricity Authority (CEA) to recommend the most suitable unit size and steam parameters for adoption in the country. The report also states 2 x 250 MW as the available size of coal power plants.

			has therefore considered the coal plant to be of 250 MW capacity as the nearest comparable size. The validation team has cross-checked from CERC order (Ref/15/) published in respect of the petition filed No. 67/2003 for the determination of the terms and conditions of tariff, that 250 MW is a standard package for the coal plants supplied in India.	
2.	Date of financial closure	01/12/2003	The date taken is the same as for the alternative –I for a comparison on equal terms and is hence appropriate	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable.
3.	Planned construction period	22 months	The period assumed is the same as for alternative-I for comparison on equal terms and is hence appropriate	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
4.	Project commissioning date	01/10/2005	The period assumed is the same as for alternative-I for comparison on equal terms and is hence appropriate	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
5.	Project cost	IN` 10000 million	The total project cost assumed is on the basis of the estimated project cost for the Govindwal Sahib	The validation team referred to the Central electricity Authority (CEA) report of the Expert Committee on fuels for power generation.

			Thermal Power Plant of GVK Industries, contract for which was awarded to GVK Industries Ltd. The estimated cost for the Govindwal Sahib plant was IN` 2000 crores (IN` 20000 million) for plant capacity of 500 MW (2 x 250 MW), from which the cost per MW comes to IN` 40 million. The assumption is on the basis of actual estimated cost for a coal power plant of equivalent capacity and is therefore justified.	The capital cost of coal based power plant in the report is stated as IN` 4 crore (i.e. 40 million) per MW, which is the same as assumed by the Project Participant
6.	Debt : equity ratio	100% debt	The assumption of debt : equity ratio is the same as for alternative-I for a comparison with alternative-I on equal terms	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
7.	Life of the plant	25 years	The life of the coal based power plant is assumed on the basis of data available from the Central electricity Regulatory Commission (CERC) regulation for year 2001 dated 27/09/2001. The life of coal based power plant as per the CERC regulation is 25 years.	The Gazette of India notification dated 29/03/1994, published by the Ministry of Power (Ref/66/), states the life of coal based power plants as 25 years.
OPERATIONS RELATED				
8.	Plant Load Factor of the plant (PLF)	85%	The PLF is assumed as the same for alternative-I to maintain comparison of both the alternatives on equal terms.	The PLF assumed is cross-checked against CERC tariff order dated 26/03/2004(Ref/57/), in which the PLF for thermal power plants is stated as

				80%. Although the PLF assumed is more (85%), the validation team confirms that a higher PLF assumed does not result in a significant decrease in the cost of generation vis-à-vis gas. Hence, the assumption is justified.
9.	Minimum PLF to prevent disincentive	68.5%	The value of minimum PLF required to be achieved by the coal based power plant is assumed to be the same as for alternative –I for a comparison on equal terms with alternative-I	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
10.	Foreign debt service charge	0.006 US $/kWh	The value of foreign debt service charge payable by the coal based power plant is assumed to be the same as for alternative –I for a comparison on equal terms with alternative-I	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
11.	Other fixed charges (on the basis of 80% PLF of the plant)	0.669 IN`/kWh	The value of other fixed charges payable by the coal based power plant is assumed to be the same as for alternative –I for a comparison on equal terms with alternative-I	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
12.	Incentive payment (for PLF of 80% and more)	0.0669 IN` /kWh	The value of incentives available to the coal based power plant is assumed to be the same as for alternative –I for a comparison on equal terms with alternative-I	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
13.	Rebate	2.5%	The value of rebate available to the coal based power plant is	The coal based power plant is an alternative considered only for comparative

			assumed to be the same as for alternative –I for a comparison on equal terms with alternative-I	working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable
14.	Auxiliary consumption	9%	The assumption of auxiliary consumption is taken from CERC tariff notification dated 26/03/2001(Ref/56/) which specifies auxiliary consumption for coal based power plants. This notification was available to the project participant prior to the date of decision. Since the CERC is a regulatory authority, the data derived from the same is regarded as authentic and hence was accepted by the validation team. The CERC notification is also available in the public domain.	The CERC tariff notification is a statutory notification that is binding on all parties concerned. Hence, the value of auxiliary consumption in the tariff order can be regarded as appropriate. The same can also be cross-checked with other tariff orders published by CERC. The tariff order of 26/03/2004 also is based on the same value of auxiliary consumption (Ref/57/). The CEA database version 6 also has specified auxiliary consumption for coal based plants to be 9%.
15.	Operations & Maintenance (O&M) cost including insurance cost	2.5%	The O&M cost is taken from CERC (terms and conditions of tariff) regulations 2001. Since the CERC is a regulatory authority, the data derived from the same is regarded as authentic and hence was accepted by the validation team. The CERC notification is also available in the public domain.	The CERC tariff notification is a statutory notification that is binding on all parties concerned. Hence, the value of O& M cost in the tariff order can be regarded as appropriate. The O&M cost can be cross-checked against other tariff orders published. The tariff order of 26/03/2004 has stated the O&M cost for 250 MW coal plant sizes as IN` 1.04 million per MW, which comes to IN`260 million for a 250 MW coal based power plant. The same is equivalent to 2.6% of the total project cost. The

				assumption of 2.5% is therefore justified.
16.	Escalation in O&M cost	6% per annum	The escalation in operation and maintenance costs is primarily related to rise in costs due to effects of inflation and therefore could be regarded as the same as for alternative-I of gas based power generation. The assumed value provides a comparison of the two alternatives on equal terms.	The rate of escalation in the O&M cost considered was also cross-checked by referring to CERC tariff notification 2001, which is a document published by the regulatory authority and available in the public domain. The tariff notification is dated 26/03/2001 and hence was available to the project participant prior to the date of decision.
ENERGY RELATED				
17.	Station heat rate of the power plant	2500 kcal/kWh	The station heat rate for coal based power plant is assumed on the basis of CERC regulations 2001. Since the CERC is a regulatory authority, the data derived from the same is regarded as authentic and hence was accepted by the validation team. The CERC notification is also available in the public domain.	The station heat rate is cross-checked with CEA database (version 6) figures which confirm the same value.
18.	Fuel cost (coal)	IN` 1183.32 per MT	The coal price is supported by Singareni Collieries Price Notification (Ref/35/) dated 04.10.2001 for D Grade coal. Singareni Collieries is a major producer of coal in southern India. It is a Government owned coal mining Company operating in the state of Andhra Pradesh.	Coal price notification is published every six months by Coal India Limited, one of the major producers of coal in the country. The periodic notification is available on Coal India's web site http://www.coalindia.nic.in/pricing.htm The validation team cross – checked the coal pricing from this web site for the price notification revised by Coal India on 27/02/2011.

			Hence, coal pricing data available from Singareni Collieries can be regarded as reliable.	This is much after the date of investment decision by the Project Participant. However, the pit head price of 'D' Grade coal in the notification is in the range of IN` 880 - 1240 per tonne. The loading and transportation charges are also specified and are approximately IN` 100 per tonne. Thus, the price of coal at the point of use as taken in the levelised cost analysis (IN` 1183 per tonne) is conservatively assumed, considering that even after 8 years the coal prices are still in the same range.
19.	Gross calorific value (G.C.V.) of the fuel (NG)	4940 kcal/kg	The G.C.V. of coal is also mentioned in the price notification issued by Singareni Collieries Company Ltd. dated 04/10/2001. The value of GCV was already available to the project participant as a source of information, prior to the date of decision. Hence, the assumption was accepted by the validation team.	Coal India Ltd., another major producer of coal in the country, provides information on the calorific values of different grades of coal on their web site http://www.coalindia.in. The G.C.V. of 'D' grade variety of coal is given as between 4800 and 5401 kcal/kg
FINANCING RELATED				
20.	Interest rate (IN`)	10.75%	The interest rate assumed is the Reserve Bank of India specified Prime Lending Rate (PLR) for Indian banks. As on the date of the Project Participant's investment decision, this rate as confirmed from the Reserve Bank of India's	As the rate assumed is drawn from the official web site of the Reserve Bank of India, there is no further need to cross-check the rate. Besides, the coal based power plant is only an alternative considered only for comparative working of the levelised cost. As there is no actual

			official web site http://rbidocs.rbi.org.in was 10.75% and the same is taken for the financial analysis. The RBI PLR was applicable on the date of the Project Participant's investment decision and is hence, acceptable as a source of information for determining the rate of interest.	plant constructed, cross-checking in this case is not applicable
21.	Interest rate (US $)	4.8%	The interest rate on the foreign currency loan is specified in the detailed appraisal memorandum of IDBI Bank sent to GVK along with IDBI's letter of intent (Ref/12/) for loan sanction dated 04/05/2001. The rate of interest is specified as LIBOR + 3.5% for US $ loan. Prior to the date of the investment decision, the LIBOR stood at 1.3%. The Project Participant has assumed this value from the internet web site www.wsjprimerate.us. Hence, the US $ loan interest rate comes to 1.3% + 3.5% = 4.8%. The US $ loan interest rate is based on LIBOR prevailing at the time of the investment decision and is hence acceptable as a source of information for determining the rate of interest.	The validation team has cross-checked the LIBOR from the web site http://www.global-rates.com/interest-rates/libor/american-dollar/2003.aspx The historical LIBOR rates are available on this web reference and the rate was 1.3% for February 2003.
22.	Loan portion	30%	The proportion of	The coal based power plant

	(US $)		foreign currency loan (FCL) was assumed by the project participant in the financial analysis submitted to the validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis.	is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable.
23.	Loan portion (IN`)	70%	The proportion of the Rupee currency loan was assumed by the project participant in the financial analysis submitted to the validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis.	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable.
24.	IN` loan repayment period	10 years	The loan repayment period was taken as an assumption by the project participant in the financial analysis submitted to the validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis. The team confirms from its experience that lenders normally stipulate 10 years to be the repayment period for medium term loans for infrastructure projects.	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable.
25.	US $ loan repayment period	10 years	The loan repayment period was taken as an assumption by the project participant in the	The coal based power plant is an alternative considered only for comparative working of the levelised

			financial analysis submitted to the validation team. The validation team agrees with this proportion as a normative estimate for the purpose of the financial analysis. The team confirms from its experience that lenders normally stipulate 10 years to be the repayment period for medium term loans for infrastructure projects.	cost. As there is no actual plant constructed, cross-checking in this case is not applicable.
26.	Moratorium for IN` loan	1 year	The moratorium was assumed to be for a period of one year from the date of loan disbursement. This is a normative assumption made by the project participant. As the loan disbursement was expected to take place in a staggered manner from the date of sanction of the loan, a period of one year as a moratorium is regarded by the validation team to be an acceptable assumption.	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable.
27.	Moratorium for US $ loan	1 year	The moratorium was assumed to be for a period of one year from the date of loan disbursement. This is a normative assumption made by the project participant. As the loan disbursement was expected to take place in a staggered manner from the date of sanction of the loan, a period of one year as a	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable.

			moratorium is regarded by the validation team to be an acceptable assumption.	
28.	Currency Exchange rate IN`/US $	IN` 47.66	This is the currency exchange rate that was prevailing at the time of the investment decision made. The same is confirmed from the web site http://www.x-rates.com/d/INR/USD/hist2002.html (Avg. exchange rate for 2002), which can be regarded as an authentic source of information on cross-currency exchange rates.	The Weekly supplement published by the Reserve Bank of India on its official web site www.rbidocs.org.in has provided the currency exchange rates for various currencies. The rates published for Feb 22nd 2003 are the closest to the date of investment decision of the Project Participant (28/02/2003). The US $/` conversion rate on that day was 47.79. The exchange rates fluctuate daily. However, the rate published by RBI is a cross-check for the rate assumed by Project Participant in the financial analysis.
29.	Discounting rate	10.75%	The rate of discounting assumed corresponds to the Prime Lending Rate (PLR) stipulated by the Reserve Bank of India (RBI). The rate applicable at the time of the investment decision has been taken. The same was confirmed by the validation team from RBI's official web site http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/34625.pdf. As the PLR is specified by RBI in the form of a range, the project participant has assumed the average of the minimum and maximum PLR that	As the discounting rate assumed is taken from the Reserve Bank of India's official web site, the same is regarded as valid by the validation team without further need to cross-check.

			were applicable at the time of the investment decision.	
WORKING CAPITAL RELATED				
30.	Working capital interest rate	13.50%	The interest rate assumed is the Reserve Bank of India specified Prime Lending Rate (PLR) for Indian banks. As on the date of the Project Participant's investment decision, this rate as confirmed from the Reserve Bank of India's official web site http://rbidocs.rbi.org.in was 10.75% and the same is taken for the financial analysis. The RBI PLR was applicable on the date of the Project Participant's investment decision and is hence, acceptable as a source of information for determining the rate of interest.	The coal based power plant is an alternative considered only for comparative working of the levelised cost. As there is no actual plant constructed, cross-checking in this case is not applicable.
31.	Working capital loan	75%	This is the margin amount out of the total working capital requirement that is financed by Banks in India. Hence, the same was accepted by the validation team.	The working capital margin was also cross-checked from State Bank of India's letter (Ref/34/) dated 23/08/2002 to the Project Participant from which it is confirmed that the working capital margin charged by bank is 25%, i.e. the loan margin would be 75%.
TAX & DEPRECIATION RELATED				
32.	Income Tax Rate	35%	As per the prevailing rates under the Income Tax Act 1961 amended by the Finance Act of 2002	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in

				which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)
33.	Minimum Alternate Tax	7.5%	As per the prevailing rates under the Income Tax Act 1961 amended by the Finance Act of 2002	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)
34.	Surcharge	5%	As per the prevailing rates under the Income Tax Act 1961 amended by the Finance Act of 2002	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)
35.	Rate of depreciation on building	3.34%	As per the Schedule XIV of the Companies Act 1956	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03 (i.e. the year in which investment decision was made)
36.	Rate of depreciation on plant & machinery	5.28%	As per the Schedule XIV of the Companies Act 1956	The rates are cross-checked against Taxmann's Direct Taxes Ready Reckoner published for the Income Tax assessment year 2011-12 & 2012-13 in which the rates for previous years including 2002-03

				(i.e. the year in which investment decision was made)

The above investment analysis described in the PDD and presented in more detail in the spreadsheets provided to the validation team meets the requirements mandated by the EB 62 Annex 05 guidelines on investment analysis (Ref/50/) and also the applied methodology AM 0029 ver. 03 (Ref/48/), with regard to the following:

- The period of assessment is not limited to the crediting period of the project activity but has been spread out over the entire operational lifetime of 15 years of the project activity. This meets the requirement of paragraph 3 of the EB 62 Annex 05 guidance.
- The project levelised cost and cash flow analysis has considered the salvage value of assets at the end of the project lifetime as 10% of the initial asset value, which is assessed by the validation team's financial expert to be fair and reasonable in the context of the project activity. The salvage value is added back as a cash inflow in the terminal year of the project lifetime. This is in accordance with paragraph 4 of EB 62 Annex 05.
- Depreciation of the plant is added back while computing the project cash flows, since it is not a real expense to the project activity. This meets paragraph 5 requirement of the EB 62 Annex 05 guidance.
- The validation team confirms that project participant has applied all the statutory levies and taxes as per the then valid tax rules. Incentives like provisions of section 80IA [deferred tax benefit] as per Indian Income Tax Act have also been correctly applied. The financial expert in the validation team has validated the same and observed that they are correct.
- All the input values considered for the investment analysis are valid and applicable at the time of the investment decision that was made on 28/02/2003. The input values have also been applied consistently in the calculations. The requirement in paragraph 6 of EB 62 Annex 05 guidance is therefore met.
- Project participant has provided to the validation team, spreadsheet versions of the investment analysis and the benchmark; that are readable and in which the individual cells, formulae and algorithms employed are viewable and unprotected. Paragraph 8 of EB 62 Annex 05 guidance on investment analysis makes it necessary for project participant to provide to validation team with spreadsheets that are readable and unprotected.

- The financial indicator selected is the levelised cost of generation and the project IRR. As the project activity is funded 100% through debt, the choice of project IRR as a financial indicator is appropriate for the benchmark analysis. Similarly, the use of levelised cost of generation for the two alternatives, viz., i) Gas based power generation and ii) Coal based power generation is appropriate as a comparison between the two alternatives is possible on the basis of unit cost of output delivered by each of the respective alternatives.
- The benchmark chosen for the investment analysis is the cost of debt in the form of the local commercial lending rate which is acceptable, as the financial indicator is also the project IRR. This is in line with paragraph 12 of the EB 62, Annex 05 guidance which states that local commercial lending rate is an appropriate benchmark for a project IRR.
- As the project activity is an independent power project that can be developed by any entity (and not just the project participant), the benchmark chosen for the analysis is based on publicly available data, which could be validated by BVCH. This is in line with the paragraph 13 of the EB 62 Annex 05 guidance.
- The choice of a benchmark analysis to demonstrate the additionality of the project activity is also appropriate and in line with the requirement of the AM 0029 ver. 03 methodology to demonstrate additionality in Step 1.
- Project participant has carried out a sensitivity analysis as described in more detail below. Results of the sensitivity analysis establish that the investment analysis is robust enough over reasonable variations in the key input parameters

Justification is provided for the choice of D grade coal in the analysis for the levelised cost of coal as below:

In India, superior quality coal is used for metallurgical industries (http://www.coalindia.in/Business.aspx?tab=2&AspxAutoDetectCookieSupport=1). The power plants generally get coal of D grade onward (however, even there, supplies are not consistent, leading to frequent shortages and coal of lower grades & quality is invariably used by the power plants – refer article available at http://articles.timesofindia.indiatimes.com/2011-10-20/nagpur/30302302_1_washeries-wash-coal-quality-coal).

A Standing Committee on Energy in 2001 also noted that 'The average GCV (Gross Calorific Value) of total coal dispatched by CIL to different sectors including power sectors during the past few years has been of the order of 4900 K.Cal./Kg.' (http://164.100.24.208/ls/committeeR/Energy/18th/chapter6.htm). This corresponds to D Grade coal, which has the GCV in the same range.

Of the proved non-coking coal resources, superior grades 12 (namely, A, B, C & D) constituted about a third; the rest were inferior coal (grades E, F & G), which is typically used for coal power plants. (Refer pg. 7, last paragraph of report at http://www.c2es.org/docUploads/india-coal-technology.pdf). Thus D grade coal that gives GCV of 4940 kcal/kg was accepted, as it is conservatively based.

The levelised cost was calculated for the two alternatives viz,

1) Alternative 1 : Gas based power generation @ IN` 1.54 per kWh
2) Alternative 2 : Coal based power generation @ IN` 1.43 per kWh

The cost of generation for gas based power generation being higher than that of coal, the latter as the baseline scenario is justified.

The methodology AM 0029 ver. 03 also requires project participants to demonstrate additionality of the project activity through an investment benchmark analysis (step 1). However, the webhosted PDD did not include a benchmark analysis. The validation team, therefore raised a Corrective Action Request (CAR-16) requiring the project participant to incorporate the benchmark analysis in line with the requirement of the methodology. In response to the same, the project participant has provided the Benchmark analysis in the revised PDD. The benchmark analysis is based on project IRR compared against the investment benchmark.

The project IRR was computed considering yearly cash flows over a 15 year investment time frame. The assumptions used for computing the Project IRR are same as presented in the table above and the validation justification for each of the parameters is also provided in the same table. The value of project IRR calculated is 10.06%.

The validation team regards the project IRR to be a suitable financial indicator for the demonstration of additionality as the project activity is funded 100% through debt and hence, in line with the requirements of paragraph 12 of the EB 62 Annex 05 guidance on investment analysis, the choice of project IRR as a financial indicator is appropriate for the benchmark analysis.

Benchmark investment analysis:

The EB 62 Annex 05 guidance on investment analysis stipulates that the benchmark chosen for the demonstration of investment analysis should be suitable for the type of IRR calculated and used. In the case of the project activity, the financial indicator employed is the project IRR.

The project participant has chosen the commercial lending rate of the IDBI Bank as a benchmark for comparison with the project IRR. Paragraph 12 of the EB 62 Annex 05 guidance states that the local commercial lending rate is an appropriate benchmark for project IRR and hence selection of the same as a benchmark meets the paragraph 12 requirement. Besides, the project activity is envisaged as a 100% debt funded investment and therefore such a benchmark is also relevant for comparison with the financial indicator.

Moreover, the EB 62 paragraph 18 guidance is essentially related to the choice of debt-equity ratio for the determination of the benchmark for the investment analysis. As the project activity is 100% debt financed, considering the debt-equity ratio in the computation of the benchmark, whether on 50%:50% or 70%:30% basis, will not be appropriate. As the project activity is 100% debt financed, the only appropriate benchmark for comparison could be a value based purely on the cost of debt alone. A weighted average cost (i.e. based on a 50:50 or on a 70:30 debt-equity ratio) will always lead to a higher benchmark which would not be conservative.

The validation team therefore accepts the chosen benchmark (Prime Lending Rate (PLR)) as a suitable benchmark. The PLR is the cost of debt funds available to borrowers with a proven track record of repayment and is hence already a conservative value for the cost of debt.

The financial indicator used to demonstrate the additionality is the project IRR. In computing the same, loan interest is added back to arrive at the net cash flow. Use of the pre-tax cost of debt as a benchmark also, therefore, is in accordance with the guidance provided in paragraph 11 of EB 62 Annex 05 guidance.

The commercial lending rate of the IDBI Bank is the same as assumed in the financial analysis for levelised cost and IRR working and is pegged at 14.5% (two percentage points above the IDBI Bank's medium term lending rate (MTLR). The MTLR is the rate at which loans are sanctioned by the IDBI Bank for projects with low risk profile and managed by borrowers with a good track record of repayment. Typically, the loans given by Banks are at interest rates higher than the MTLR, by one or more percentage points, on a case to case basis, depending upon the risk profile of the project and the credit worthiness of the borrowing entity.

The project participant had initially approached IDBI Bank for debt funding of the project activity and the Bank had also issued them a letter of intent (LoI) dated 04/05/2001 for loan sanction (Ref/12/), along with a detailed commercial appraisal of the project activity. The validation justification for the loan interest rate is provided in detail in the table above. The validation team accepted the rate assumed since it was based on IDBI MTLR prevailing at the time of the investment decision and can therefore be considered as a conservative value for the cost of debt in the market. The rate of interest is also stated in the IDBI's detailed appraisal memorandum of the project activity (Ref/12/) and also confirmed from the data on interest rates published on the Reserve Bank of India's web site.[13]

The benchmark (cost of debt) thus selected is 14.50% and the project IRR was compared against the same. The validation team notes that the project IRR of 10.06% is much lower than the benchmark.

The project IRR is below the benchmark. Step 2(d) of the Tool for the demonstration and assessment of additionality (EB 65 annex 21) states that the project activity can not be regarded as "financially attractive". The validation team therefore agrees that the project activity is additional because the project IRR is less than the benchmark.

The validation team regarded the benchmark analysis presented in the PDD to be in line with the EB 62 Annex 05 guidance on investment analysis:

- The financial indicator selected is the project IRR. As the project activity was planned as a 100% debt funded investment, the choice of project IRR as a financial indicator is appropriate for the benchmark analysis.
- The benchmark chosen for the investment analysis is the cost of debt in the form of the local commercial lending rate which is acceptable, as the financial indicator is also the project IRR. This is in line with paragraph 12 of the EB 62 Annex 05 guidance which states that local commercial lending rate is an appropriate benchmark for a project IRR.
- As the project activity is an independent power project that can be developed by any entity (and not just the project participant), the benchmark chosen for the analysis is based on publicly available data, which could be validated by BVCH. This is in line with the paragraph 13 of the EB 62 Annex 05 guidance.

[13] http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/34625.pdf

- The benchmark is based on the commercial lending rate of IDBI Bank, whom the Project Participant had approached initially for obtaining funding for the project activity. The commercial lending rate is a standard market parameter. Commercial interest rates of the IDBI Bank are regularly accessible on the Reserve Bank of India's (RBI) web site. The project activity is the generation of power in a natural gas based power plant. It is possible for the project activity to be developed by any investor and not only the Project Participant. It would not be appropriate, therefore, to apply a benchmark that is based on the individual profitability expectation of the Project Participant. In the context of the project activity, the cost of debt is an appropriate benchmark as it is not investor specific. The choice of the benchmark is hence in line with paragraph 13 of the EB 62 Annex 05 guidance. The choice of a benchmark analysis to demonstrate the additionality of the project activity is also appropriate and in line with the requirement of the AM 0029 ver. 03 methodology to demonstrate additionality in Step 1.

The validation team has confirmed that all data used to arrive at the benchmark was derived from sources available to the project participant at the time of the investment decision and hence the validation team accepted the same.

The data is obtained from sources that can be accessed and hence, could be validated by BVCH. The benchmark thus computed is a reasonable expectation of return by an investor and also meets the requirements of the EB 62 Annex 05 "Guidelines on the Assessment of Investment Analysis" and hence the validation team has accepted the same.

Sensitivity analysis:

The project participant has carried out a sensitivity analysis in order to determine whether small changes in the values of the input parameters were likely affect the overall result of the analysis. Paragraph 20 of the EB 62 Annex 05 guidance on investment analysis requires sensitivity analysis to be carried out for all variables that contribute to 20% of either total project costs or total project revenues. Accordingly, the sensitivity analysis carried out by the project participant has subjected the following variables to variation in the levelised cost analysis for both alternatives, viz., gas based power generation and coal based power generation :

i) Total project cost

ii) Plant Load Factor (PLF)

iii) Station heat rate of the power plant

iv) Fuel cost

v) Loan Interest rate

In addition to the above parameters, the following were also subjected to a range of variation:

a) O & M cost

b) Auxiliary consumption of the power plant

c) Escalation on O&M cost

Validation team had raised clarification CL-8, requesting the project participant to explain as to why in the web hosted PDD, the sensitivity analysis was limited to only 2 parameters-PLF and fuel cost. The Project Participant therefore brought above additional parameters also into the analysis.

The validation team accepts these parameters of choice for the sensitivity analysis with the following justifications:

i) Total project cost:

The total project cost assumed in the financial analysis for levelised cost is based on the information available at the time of the decision. As the project implementation, when taken up, would occur over a period of time, the actual project cost incurred could be different from the assumption made.

Hence, it is appropriate to subject this parameter to sensitivity analysis. In the case of the project activity, the validation team noted that actual cost incurred for implementing

The actual project cost, stated in Schedule XVI of the Common Loan Agreement (Ref/33/) of GVK Industries with the lender consortium, was IN` 7203.7 million. The actual project cost is only slightly lower than assumed in the financial analysis (IN` 7251.6 million) and hence, the validation team accepted a range of -10% for the sensitivity to be appropriate, as this range more than covers the actual cost.

With this range of variation, the levelised cost of power produced (For alternative 1-Gas based power generation) was worked out to the following:

Variation	Levelised cost IN`/kWh
-10%	1.48
+10%	1.61

The corresponding values of the project IRR for the same range of variation are worked out as follows:

Variation	Project IRR
-10%	10.71%
+10%	9.39%

For the baseline alternative 2 (i.e. coal based power generation), the sensitivity was carried out over a range of +/- 10% and is accepted as appropriate by the validation team because it is as per the requirements in paragraph 21 of EB 62 Annex 05 which specifies the general range of variation that should be applied to parameters being subjected to the sensitivity analysis.

The levelised cost of generation in case of alternative -2 works out as below for the range of variation of +/-10%.

Variation	Project IRR
-10%	10.71%
+10%	9.39%

For the baseline alternative 2 (i.e. coal based power generation), the sensitivity was carried out over a range of +/- 10% and is accepted as appropriate by the validation team because it is as per the requirements in paragraph 21 of EB 62 Annex 05 which specifies the general range of variation that should be applied to parameters being subjected to the sensitivity analysis.

The levelised cost of generation in case of alternative -2 works out as below for the range of variation of +/-10%.

Variation	Levelised cost IN`/kWh
-10%	1.37
+10%	1.51

ii) Plant Load Factor:

This input parameter used in the financial analysis was subjected to a variation of +/- 10% in the case of alternative -1 (gas based power generation). The project activity plant was commissioned in 2009. Hence, actual operational data from the plant after its commissioning was available to the validation team. Referring to this data, it was observed that the actual PLF realised by the plant in its operation after it's commissioning was 90.34% (for the first year of operation 2009-10) and 81.75% (for the second year of operation (2010-11). This was known from the certificate (Ref/10/) issued by an independent Chartered Engineer who evaluated the plant performance.

The same is also corroborated by actual plant records inspected by the team at the time of the site visit carried out on 17/10/2011. The actual PLF was 6.28% higher than the assumption of 85% during the first year. Hence, the validation team regards the range of variation of +/-10% for the PLF to be appropriate, as this range of variation has covered the actual PLF also.

The levelised cost and project IRR values resulting from subjecting the PLF to this range of variation are as follows:

Variation	Levelised cost IN`/kWh
-10%	1.61
+10%	1.47

Variation	Project IRR
-10%	7.47%
+10%	10.18%

For alternative -2 (coal based power generation), the sensitivity was carried out over a range of +/-10% and is accepted by the validation team since it is as per the requirements in paragraph 21 of EB 62 Annex 05 which specifies the general range of variation that should be applied to parameters being subjected to the sensitivity analysis.
The corresponding value of levelised cost for alternative -2 are as follows:

Variation	Levelised cost `/kWh
-10%	1.51
+10%	1.36

iii) Station heat rate (SHR) of the power plant:

For alternative-1 (gas based power generation), the station heat rate parameter used in the financial analysis was subjected to a variation of +/-10%. The validation team regards this range as appropriate since the actual SHR realised by the gas based power plant that is in operation since its commissioning in 2009 is 1806 kcal/kWh for the first year of operation (2009-10) and 1854 kcal/kWh for the second year (2010-11). These values have been certified by an independent Chartered Engineer (Ref/10/). The actual recorded SHR is almost the same as assumed. However, a sensitivity analysis has been carried out over +/- 10% range and therefore covers the actual values also.

The levelised cost and project IRR values resulting from subjecting the Station Heat Rate to this range of variation are as follows:

Variation	Levelised cost IN`/kWh
-10%	1.46
+10%	1.62

Variation	Project IRR
-10%	10.13%
+10%	10.00%

For alternative -2 (coal based power generation), the sensitivity was carried out over a range of +/-10% and is accepted by the validation team since it is as per the requirements in paragraph 21 of EB 62 Annex 05 which specifies the general range of variation that should be applied to parameters being subjected to the sensitivity analysis.

The corresponding values of levelised cost for alternative -2 are as follows:

Variation	Levelised cost IN`/kWh
-10%	1.37
+10%	1.50

iv)Fuel Cost:

The fuel cost (i.e. cost of natural gas) for the project activity in alternative -1 (gas based power generation) was confirmed from the actual invoices for gas supply to the plant after its commissioning in year 2009. From the sample invoices for actual gas supply to the project activity during the period from 16/07/2011 to 31/07/2011 verified by the validation team and a break-up computation (Ref/42/) of the cost of gas supplied submitted by the project participant, the actual cost of gas supplied to the plant is observed to be ` 9695 per 1000 SCM including the cost of transportation. The cost is therefore more than double the cost assumed for the analysis. (`4200 /1000 SCM). Hence, the validation team accepted the range of variation of +/-10% for this parameter. The levelised cost and IRR working is therefore very conservative as the actual cost of gas is much higher than assumed. The levelised cost and project IRR computed for this range of variation of the fuel cost are as follows:

Variation	Levelised cost IN`/kWh
-10%	1.46
+10%	1.62

Variation	Project IRR

-10%	10.13%
+10%	10.00%

The fuel cost (i.e. cost of coal) was also subjected to a +10%/-10% range of variation in the sensitivity analysis for alternative-2 (coal based power generation). The prices of coal are administered and controlled by the Government of India's Ministry of Coal. Hence, a rise in coal prices beyond this range is not a likely scenario and hence the range of variation (+/-10%) is accepted as appropriate by the validation team. The range of variation is also in line with paragraph 21 of the EB 62 Annex 05 guidance on investment analysis.

The corresponding value of levelised cost for alternative -2 are as follows:

Variation	Levelised cost `/kWh
-10%	1.37
+10%	1.50

v) Loan interest rate:

The actual rate of interest on loan was confirmed from the common loan agreement dated 20/11/2003 between GVK Industries Ltd and a syndicate of lenders to the project activity. This rate was in the range of 9.90% to 9.92 % among 11 banks who are a part of a syndicate of lenders (Ref /33/). As the actual rate of interest is significantly lower than the assumed rate, project participant has also carried out a sensitivity check on the rate of interest as an input parameter. The difference between assumed rate of interest and the actual rate is 8%; hence this parameter was subjected to a range of variation to cover this difference. The same variation was applied to the levelised cost working for alternative-1 (gas) & 2 (coal) and also for the project IRR calculation for alternative -1 (i.e. gas based generation). The resulting values of levelised cost of generation and project IRR for the two alternatives are as follows:

Alternative-1 (Gas based power generation)

Variation	Levelised cost IN`/kWh
-10%	1.51
+10%	1.56

Variation	Project IRR
-10%	10.08%
+10%	10.05%

Alternative-2 (Coal based power generation)

Variation	Levelised cost IN`/kWh
-10%	1.41
+10%	1.46

a) O & M cost

The actual O& M cost of running the project activity was checked by the validation team from the O&M agreement of GVK Industries with its group company GVK Power & Infrastructure Ltd. annexure-H of the O&M agreement has stated the year-wise tentative O&M budget for every year of operation of the plant since the date of commercial operation. The O&M budget is stated for normal O&M expenses and also for major maintenance that would be undertaken during the lifetime of the project activity.

The validation team observed that the O&M expenses stated in the agreement come to 3.3 % of the total project cost, on an average basis. As the O&M cost assumed for the levelised cost and IRR analysis is 4% of the project cost, the difference between the assumed O&M cost and the actual O&M cost as per the O&M agreement is 17%.

A clarification request was raised (CL- 9) on the appropriateness of the 10% range taken for O&M cost in the sensitivity analysis. The Project Participant submitted a working of the sensitivity analysis covering the actual range of variation in the O&M cost (17%). The levelised cost of gas based power generation for a -17% decrease in the O&M cost works out to ` 1.50 per kWh (which is still less than the levelised cost for coal) and the IRR increases slightly to 11.24%, which is still below the benchmark for the investment analysis. Thus, it was seen that the results of the analysis are not materially different even by subjecting the O&M cost to a variation of -17%.

The resulting values of levelised cost of generation and project IRR for the both the alternatives are as follows:

Variation	Levelised cost `/kWh
-10%	1.52
+10%	1.56

Variation	Project IRR
-10%	10.70%
+10%	9.33%

The corresponding value of levelised cost for alternative -2 is as follows:

Variation	Levelised cost `/kWh
-10%	1.42
+10%	1.45

b) Escalation on O&M cost

The assumption made in the financial analysis is for 6%. However, as the actual escalation could be different from the assumption made, this input was also subjected to a variation of 10%. The range of variation is in line with EB 62 Annex 5 Guidelines on Investment analysis paragraph 21.

The resulting values of levelised cost of generation and project IRR for the both the alternatives are as follows:

Variation	Levelised cost `/kWh
-10%	1.53
+10%	1.55

Variation	Project IRR
-10%	10.33%
+10%	9.78%

The corresponding value of levelised cost for alternative -2 is as follows:

Variation	Levelised cost `/kWh
-10%	1.42
+10%	1.44

c) Auxiliary consumption by the power plant

Auxiliary consumption as a percentage of the power generation was assumed to be 3% for the project activity. The actual auxiliary consumption by the project plant since its commissioning was 1.63% (for 2009-10) and 1.95% (for 2010-11). As this is lower, the validation team requested vide CL-8 why the range of sensitivity should not cover the actual value of auxiliary consumption. The parameter was therefore subjected to a variation of -50%, which covers the value of auxiliary consumption up to 1.63% and beyond.

However, the team observed that the actual auxiliary consumption of the plant, considering its overall operational lifetime is likely to be 3%, as per the assumption made. The CERC regulations of tariff specify this value for auxiliary consumption. The first two years data is not necessarily an indicator of the actual consumption that could be expected over the operational lifetime of the project activity, as in the initial years of operation, the consumption is lower and can be expected to go up in the later years.

The resulting values of levelised cost of generation and project IRR for the alternative-I (gas based power generation) are as follows:

Variation	Levelised cost `/kWh
-10%	1.53
+10%	1.54

Variation	Project IRR
-10%	10.06%
+10%	10.06%

The project IRR does not change even if the auxiliary consumption is varied by +/- 10% or for any other variation for that matter. This is because the revenue model considered for the project IRR working is based only on gross generation by the project activity and hence, is independent of the auxiliary consumption.

The corresponding value of levelised cost for alternative -2 is as follows:

Variation	Levelised cost `/kWh
-10%	1.42
+10%	1.45

The sensitivity analysis for both alternatives is presented in a consolidated tabular format as below: For Levelised Cost of Generation:

S. N.	Parameter varied	**Levelized Cost of generation (`/ kWh)**	
		Project activity implemented without the CDM	Power generation using coal as the energy source
		+10%	+10%
1	Capital cost	1.61	1.51
2	Fuel price	1.62	1.50
3	Heat rate	1.62	1.50
4	Plant load factor	1.47	1.36
5	O&M cost	1.56	1.45
6	Auxiliary consumption	1.54	1.45
7	Interest rate	1.56	1.46
8	Escalation on O&M cost	1.55	1.44

S. N.	Parameter varied	**Levelized Cost of generation (`/ kWh)**	
		Project activity implemented without the CDM	Power generation using coal as the energy source
		-10%	-10%
1	Capital cost	1.48	1.37
2	Fuel price	1.46	1.37

3	Heat rate	1.46	1.37
4	Plant load factor	1.61	1.51
5	O&M cost	1.52	1.42
6	Auxiliary consumption	1.53	1.42
7	Interest rate	1.51	1.41
8	Escalation on O&M cost	1.53	1.42

For Project IRR:

S. N.	Parameter varied	Project IRR with variation of studied parameter		Benchmark
		+10%	-10%	
1	Capital cost	9.39%	10.71%	14.5%
2	Fuel price	10.00%	10.13%	
3	Heat rate	10.00%	10.13%	
4	Plant load factor	10.18%	7.47%	
5	O&M cost	9.33%	10.70%	
6	Auxiliary consumption	10.06%	10.06%	
7	Interest rate	10.05%	10.08%	
8	Escalation on O&M cost	9.78%	10.33%	

The results of the sensitivity analysis performed on various parameters as described above indicate that for the range of variations of these parameters,

- the levelised cost of generation of coal based power generation continues to be lower than that of gas based power generation even with the range of variations applied in the sensitivity analysis
- the project IRR for investment in gas based power plant also does not meet the selected benchmark of cost of debt (13.5%) for any range of variation of the selected input parameters within the sensitivity range applied

From the sensitivity analysis, the validation team therefore concluded that the financial analysis for levelised cost and project IRR can be regarded as being robust to a reasonable range of variation in the values of the input parameters. Hence, the results indicated by the financial analysis, viz,

- the baseline alternative to the project activity is a coal based power plant of capacity 250 MW as stated in the PDD
- the Step 1 of the applied methodology AM0029 ver. 03, combined with the Tool for the demonstration and assessment of additionality EB 65 Annex 21, regarding the assessment of additionality is fulfilled.

BVCH, based on the assessment result by the financial expert engaged, hereby confirms that the underlying assumptions are appropriate and the financial calculations are correct.

3.7.4 Barrier analysis (118)

The project participant has not claimed that there are any barriers to the implementation of the project activity. Hence, this requirement of the VVM is not applicable to the validation assessment of the project activity.

3.7.5 Common practice analysis (121)

In accordance with Step 2 of the assessment of additionality under the AM 0029 methodology, the project participant is required to demonstrate that the project activity is not common practice in the relevant country or sector, by applying the step 4 of the Tool for the demonstration and assessment of additionality. The same has been presented in section B.5 of the PDD and is described and validated as below.

The description in the web hosted PDD did not clarify the criteria applied for the common practice analysis, viz., the geographical scope, the scale of the projects chosen for comparison, the environment with respect to regulatory framework and investment climate, access to technology & financing, etc. During the validation, the team raised a clarification request [CL-14]. In their response, the project participant has revised the PDD and a detailed explanation is provided on the criteria that were used to select projects "similar" to the project activity in the common practice analysis.

Geographical scope of the common practice analysis:

The requirement specified under the methodological tool for the Demonstration & Assessment of Additionality (EB 65 Annex 21) is for the applicable geographical area to be the entire host country as a default. However, the individual states within the host country have their own policies and regulatory regime for power sector projects. Also, the investment climate in certain states is more favourable than in others. Considering all these factors, the Project Participant has chosen the applicable geographical area for the common practice analysis to be smaller than the host country, as the gas based power plant technologies in different states differ in terms of the

- State promotional policies
- Investment climate from state to state &
- The regulatory regime prevalent in the individual states

The validation team agrees that this approach is in line with the Tool for demonstration and Assessment of Additionality (EB 65 Annex 21), which permits the applicable geographical area to be smaller than the host country, provided justification can be provided for the same.

As the project activity is a new plant constructed within the boundary of the southern grid, the geographical boundary of the southern grid was selected to be the geographical scope for demonstration of the common practice analysis, as the gas based power plants connected to the Southern grid fall within the same region, i.e. Southern India. The validation team notes that the region selected is the combined area of the southern states and is thus large enough to cover an entire sub-region of the country.

The boundary of the southern grid encompasses all the southern states of India, viz., Tamil Nadu, Andhra Pradesh, Karnataka, Kerala & Pondicherry. As per the requirements of sub-step 4a of the Tool for the demonstration and assessment of additionality, project activities for comparison in the common practice analysis should fall in the same country/region as the project activity. The validation team therefore agrees with the geographical scope chosen by the project participant.

Technology-wise "similar" projects:

The project activity is based on the power generation using natural gas as the fuel in the combined cycle mode of operation. Gas based power plants either operates in the combined cycle or in open cycle of operation. However, both these modes are based on broadly similar technology which is the "generation of power using gas turbines". The validation team agrees that the same is also in line with the sub-step 4a of the Tool for the demonstration and assessment of additionality which requires that similar projects be based on a "broadly similar technology".

Scale of "similar" projects:

The project participant has identified all gas based power plants in the Southern grid that had started commercial operation before the start date of the project activity i.e. 14/01/2004 for comparison. A list of all such plants, presented in the PDD, is also confirmed by the validation team from the data available from the latest version of the CEA database available at the time of validation, viz. v03. The CEA database is available from the Central Electricity Authority, a statutory Body in India, constituted under the erstwhile Electricity (Supply) Act, 1948, that was subsequently replaced by the Electricity Act 2003 and its office is an "Attached Office" of the Ministry of Power, Government of India. The data published by the CEA is an official publication of the Government of India and can be regarded as a reliable and authentic source of data for the power sector in India.

From the CEA database, it is seen that there were a total of 32 such gas based power plants. These plants were operational at the time of the investment decision, as confirmed from the CEA database and hence the selection of these plants meets the requirement of Sub-step 4a of the

Tool for the demonstration and assessment of additionality, which states that only those plants operational be considered for the demonstration of the common practice analysis. A list of these 32 plants is included by the Project Participant in the PDD.

The capacity of the identified 32 plants ranges from 5 MW (at the lower end) to 330.5 MW (at the upper end). The gross generation capacity of the project activity is 228 MW; hence , for the purpose of comparison only those plants are considered which have a capacity of at least +50%/-50% (or more) of the output capacity of the project plant, i.e. of capacities ranging from 114 MW and above upto 342 MW. The validation team agrees that the projects falling in this range could be regarded as "similar" to the project activity in terms of scale. The capacity filter of +50%/-50% applied in the selection of projects also meets EB 63 Annex 12 guidance requirements stated in paragraph 5 of the guidance.

After applying this criterion, the list of projects is reduced from 32 to 6. These six projects are as follows:

Sr. No.	*Name*	*Capacity*	*Date of commissioning*	*State*	*Ownership*
1.	Kondapalli GT	126 MW	22.06.2000	Andhra Pradesh	Private
2.	Peddapuram CCGT	220 MW	26.01.2002	Andhra Pradesh	Private
3.	Kayamkulam GT	115.3 MW	26.11.1998	Kerala	Government
4.	Kayamkulam GT	115.3 MW	28.02.1999	Kerala	Government
5.	Kayamkulam GT	119.4 MW	30.10.1999	Kerala	Government
6.	P. Nallur CCGT	330.5 MW	22.02.2001	Tamil Nadu	Private

GT : Gas Turbine CCGT : Combined Cycle Gas Turbine

Comparable environment w.r.t. "access to finance":

The Project Participant has excluded the gas based power plants in the above list that are Government owned. The validation team agrees with the Project Participant's contention in the PDD that in terms of their capability to access financing, private projects can not be treated on par with Government projects as the latter are known to enjoy special debt terms. Government decisions to set up infrastructure projects are also guided by other social development considerations such as ensuring that reliable supply of power is made available to the community, costs of generation of power notwithstanding.

The Project Participant has therefore taken only 3 projects out of the 6 in the above list. The projects owned by State Government have been excluded.

Comparable environment w.r.t "investment climate":

The 3 projects that remain for comparison were already operational at the time of G.V.K.'s decision to set up the project activity in February 2003. These projects were set up as Independent Power Producers (IPPs). The IPPs were not governed by any specific PPA. The power producers were compensated by their respective state Government power purchasers on the basis of the fixed cost and the variable cost components of power generation together with the expected return on equity, in a typical cost plus structure of two part tariff. The project owners therefore were ensured that they would be reimbursed the fixed and variable costs of running the power plants even in the event of any escalation taking place in fuel costs or other overheads and they would also continue to receive a fixed return on their investment in the project.

The project activity, on the other hand, was established at a time when an international competitive bidding (ICB) process was in existence; in which the bidder was expected to quote a tariff structure in the bid submitted and was also under obligation to adhere to the same as a part of the contractual terms and conditions. The validation team therefore agrees that the investment climate under which the project activity came up was not the same that prevailed during the time the above 3 plants (i.e. Sr. Nos. 1, 2 & 6 in the above table) were set up. This is further explained as follows.

Projects set up through the competitive bidding process were essentially different from the other projects that were in existence as "Independent Power Producers" (IPPs). The investment climate that existed during the late 90's to early 2000 decade could be divided into following two phases, viz, i) with respect to regulatory changes in the PPA and ii) types of fuel used, for the power sector in Andhra Pradesh state wherein the project activity is also located.

a) Pre-1995 period: Before bids through ICB route were invited in 1995, Government policy was to allow projects that would be set up as Independent Power Producers (IPPs). A two part tariff structure was available for IPP projects also. However, such plants (including the phase I project of GVK Industries Ltd.), were assured of getting a fixed Return on Equity (RoE). Two of the plants listed in the table on page no. 104 of the validation report, viz., Kondapalli GT and Peddapuram CCGT were set up, having this tariff structure in the PPA. Under this arrangement, project owners would continue to receive a fixed RoE year after year on their invested equity. It was

ensured that the RoE would be paid to the project owner irrespective of the invested equity amount.

b) After the bidding process was initiated in 1995, there was a shift in Government policy and new power producers participating in the bidding process were required to quote a two part tariff having a fixed cost component based on a foreign debt service charge and fixed charge. Though the project owner (bidder) had the freedom to have the RoE built into the fixed cost, it was necessary for the bidder to also be competitive to ensure that the bid was selected. This introduced an element of competitiveness into the power sector as individual bidders would now have to compete with market forces and submit competitive bids in order to secure contracts. In the process, it could be likely that a bidder would quote the tariff structure based on a lower RoE, in an effort to remain competitive and improve the bid's chances of being selected. The project owners in the pre-1995 period did not face such a competitive scenario, however the project activity power plant of GVK Industries Ltd. was also asked to meet the same competitive tariff structure as for the projects submitted through ICB process. Thus, the project activity, despite applying to the GoAP for permission to be set up before 1995 (i.e. start of the ICB process), was not entitled to an assured RoE that plants set up prior to 1995 had enjoyed. This is the most significant distinction between the project activity and the power plants established in the pre-1995 period, among them the 2 plants – Kondapalli GT, Peddapuram CCGT and also the third plant P. Nallur CCGT (the Nallur plant also had been allowed under the pre-1995 regime in the state of Tamil Nadu. This plant did not come up under any competitive bidding process and hence enjoyed a fixed RoE. This was confirmed by the validation team from http://www.rajenergy.com/agall1.htm. The validation team also referred to a news item 14 published in "The Hindu Businessline", a reputed national daily to confirm that the P. Nallur plant had also been enjoying the benefits of assured RoE of 16%.

In line with the sub-step 4b of the Tool for the Demonstration and Assessment of Additionality EB 65 Annex 21, therefore, the validation team regards the different tariff structure for the project activity and the 3 plants remaining in the common practice analysis, as an essential distinction. The 3 similar plants (Kondapalli, Peddapuram &

[14] http://www.thehindubusinessline.in/2005/04/18/stories/2005041801731300.htm

P. Nallur enjoyed the benefit of an assured Return on Equity which the project activity did not (since it was required to match the terms applying to the ICB projects).

Even after the award of projects through the ICB routes to project owners, there still continued to be further changes. The Government policy of acceptance of fuel type used in the power plant on a "pass-through" basis (i.e. irrespective of the type of fuel used) till then, changed and natural gas, which till then was acceptable as a "secondary" fuel, was made as the "primary" fuel for power generation. Previously, secondary fuel was allowed in case of the unavailability of the primary fuel. With the change in policy, natural gas was designated as the primary fuel and no secondary fuel was permitted for use. These changes applied only to power plants under the ICB route. The plants already existing as IPPs were not affected due to these changes and even today, these plants are allowed to operate on the "fuel pass" principle, i.e. the power generation entity is compensated even if there is a switch from a cheaper fuel to a costlier one, sometimes necessitated due to the unavailability of the primary fuel. The fuel pass arrangement is, however, not applicable to the project activity. The project activity can run only on natural gas and cannot use naphtha, as per the terms of the amended PPA dated 26.05.2008 (Ref 45) even in case of a temporary unavailability of natural gas. The restriction of fuel use for the project activity also therefore, constitutes an essential distinction between the project activity and the 3 similar projects observed while carrying out the common practice analysis.

Part (b)

The tariff structure for IPP projects set up prior to 1995 was essentially distinct from the tariff structure applying to the project activity. One of the important elements of the tariff structure, described in detail in the response to part (a) above is the "Fuel pass through" arrangement allowed for pre-1995 projects

Sub-step 4 (b) of the Tool for the Demonstration and Assessment of Additionality EB 65 annex 21 provides guidance on the assessment of the impact of essential changes on project implementation. In accordance with the same, the validation team has assessed what impact the tariff structure would have on the implementation of the project activity.

Power plants have a choice of fuel to be used. However, to maintain a lower cost of power generation, a plant would always attempt to use the cheaper fuel as the primary fuel, retaining the option of using the costlier fuel as a secondary choice. The use of secondary fuel is only in circumstances when the primary fuel is either temporarily unavailable or is in short supply. The tariff structure in the PPA that were applicable to pre-1995 projects that were set up as IPPs not only permits the use of secondary fuels but also makes it mandatory for the power purchaser to compensate the generating entity for the extra cost incurred in the generation of power by using these costlier secondary fuels. This is a major advantage enjoyed by these plants as they have the freedom to use an alternate fuel and yet retain the profitability of their operations at the same levels as with the use of the primary fuel. The 3 plants left in the analysis , viz. ,Kondapalli, Peddapuram and P. Nallur plants enjoy this advantage.

The project activity, on the other hand, is constrained by the terms of the PPA signed with APTRANSCO to use only natural gas as fuel. No other fuel is permitted to be used under the terms of the PPA. This implies that in the event of a temporary unavailability or shortage of natural gas for the project activity, the plant would be forced to remain idle for want of fuel supply. Such situations are known to have taken place in the past due to gas supply disruptions and could also be envisaged in future scenarios. Keeping the plant idle, even if for brief durations, severely affects the plant's overall financial performance and profitability and is capable of affecting its economic viability.

The validation team therefore has assessed that absence of fuel pass provision in the tariff structure of the project activity has an impact on the economic feasibility of the project activity. CDM revenues would mitigate this impact and enable the implementation of the project activity.

Hence, the 3 plants can not be regarded as similar to the project activity and have been excluded from consideration by the Project Participant.

Moreover, all the 3 plants (sr. Nos. 1, 2 & 6) identified in the list were earlier operating on naptha and subsequently changed over to natural gas. By virtue of making a fuel switch from naptha to natural gas, the said 3 projects had also applied for CDM benefits. This was confirmed by the validation team from the project activities listed on the UNFCCC CDM web site. According to step 4a of the additionality tool, registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in the common practice analysis. The 3 projects mentioned above were published on the UNFCCC CDM web site for global stakeholder comments. Hence, the validation team accepts that these 3 projects should not be considered in the common practice analysis.

The results of the common practice analysis show that (as required by the Step 4 of the Tool for the demonstration and assessment of additionality EB 65 Annex 21), other than the project activity, there are no other projects

a) Operational prior to the start date (14/01/2004) of the project activity and
b) In the same country/region (geographical boundary of the southern grid of India) and/or
c) Relying on a broadly similar technology as the project activity (gas based power generation),
d) Of a similar scale (+50%/-50% of the capacity of the project activity), and
e) Taken place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing etc.

The web site of the Government of India's Ministry of Power (http://powermin.gov.in/indian_electricity_scenario/introduction.htm) gives a snapshot of the power sector in India, from which it can be noted that even today, the installed capacity of gas based power plants in India is only 9.75% of the total installed capacity.

The project participant has also presented the Common practice analysis in the PDD in line with the requirements stipulated under paragraph 47 of the EB 65 Annex 21 Tool for the demonstration and assessment of additionality (version 6.0). Paragraph 47 requires a step-wise elimination procedure to be followed. The Project Participant has provided to the validation team, a detailed excel spreadsheet (Ref /41/) of steps applied in the common practice analysis. The worksheet "Instructions" in this spreadsheet describes how data filters are applied at each step to arrive at the result.

For the purpose of the demonstration of the common practice analysis, the project participant has chosen the entire host country India as the applicable geographical

area, as a default. This is as per paragraph 5 of the EB 65 Annex 21 tool. The spreadsheet identifies all the power plants in the country. This list is based on the data published by CEA in its CO2 database version 03 (Ref/55/). The CEA (Central Electricity Authority) is a body constituted under the Government of India's Ministry of Power. The data published by CEA on the power plants in India can therefore be regarded as the most authentic for the purpose of demonstration of the extent of diffusion of power plant technologies in the country. Version 3 of this database that was taken as the source of information for the common practice analysis, was published on 15/12/2007 and hence is updated with respect to the data on power plants that had started commercial operation prior to the start date of the project activity (14/01/2004).

The Common practice analysis spreadsheet prepared by the Project Participant applies a stepwise elimination procedure in line with the requirements specified in EB 65 Annex 21 paragraph 47. The individual worksheets in the main excel spreadsheet define each of the four steps that are involved in the demonstration of the common practice analysis.

a) the worksheet 'Source' lists all the power projects in the country. This list is drawn form the CEA database version 3. The list represents all the power plants installed within India and is the starting point for the analysis. They include all categories; thermal (coal/gas/lignite/naphtha/diesel/oil), hydro and also nuclear power plants.

b) the worksheet 'Step 1' corresponds to Step 1 of the paragraph 47 of the EB 65 Guidance referred to above. This step calculates the capacity range +50%/-50% of the output capacity of the project activity (228 MW).

Output of Step 1 : *the capacity range is calculated as 114 MW to 342 MW*

c) the worksheet 'Step 2' then shortlists all power plants within the identified capacity range in the Step 1, which had started commercial operation before the start date of the project activity (14.01.2004). This is the number N_{all} of paragraph 47 Step 2 of the EB 65 Guidance.

Output of Step 2 : *the worksheet lists*

- only those power plants that had already commenced operation prior to the project activity's start date.

-None of the plants identified had been undergoing CDM validation.

-In this step, the number $\boldsymbol{N_{all}}$ *is identified as* ***317****.*

d) the worksheet 'Step 3' identifies those projects that apply technologies that are different from the technology of the project activity. This step therefore results in identifying, by elimination, those plants which are based on technologies similar to the project activity. The different technologies constitute the following :

- Hydro and nuclear plants
- Thermal Power plants that use fuel/s other than natural gas [such as coal, diesel, lignite, naphtha, nuclear and hydro]

As the project activity is a gas based plant, it is appropriate to compare only those power plants with technology and fuel similar to the project activity (as defined in paragraph 9a of the EB 65 Annex 21 Methodological Tool for the Demonstration and Assessment of Additionality), for the purpose of the common practice analysis. The exclusion of hydro, nuclear as well as thermal power plants using fuels other than gas, is therefore justified.

The validation team therefore agrees with the above criteria employed in defining different technologies. The number of projects identified, as applying different technologies, is the number N_{diff} that Step 3 of EB 65 Annex 21 guidance refers to. That number is inferred from this worksheet, as 289.

Output of Step 3 : *the worksheet identifies the number* ***N_{diff}*** *under this Step as* ***289****.*

e) the worksheet 'Step 4' is the final step in the analysis. It involves computation of the diffusion factor F from the values of N_{all} and N_{diff} arrived at from Steps 1, 2 & 3. The same is computed as

$F = 1- (N_{diff}/N_{all}) = 1- (289/317) = 0.09$

Output of Step 4 : *the factor F referred to in this step is computed as* ***0.09***.

As per paragraph 47 of the EB 65 annex 21 tool for the demonstration and assessment of additionality (version 6),

"The proposed project activity is a common practice within a sector in the applicable geographical area if ***both*** *the following conditions are fulfilled:*
(a) the factor F is greater than 0.2, and
(b) Nall-Ndiff is greater than 3.

The EB 65 Annex 21 guidance stipulates that both the above conditions, viz., (a) as well as (b) would need to be fulfilled for the proposed project activity to be a common practice in the applicable geographical area. This implies therefore, that if even one of the two conditions is not fulfilled, the proposed project activity is not a common practice in the applicable geographical area.

In the case of the project activity, F = 0.03 < 0.2 and hence condition (a) referred to above (i.e. F > 0.2) is not fulfilled. Thus, it can be concluded that the project activity is not a common practice in the applicable geographical area.

The result of stepwise procedure in line with the EB 65 annex 21 Guidance on the demonstration and assessment of additionality indicates that implementation of Natural gas based power plants is not a common practice in the host country.

Hence, BVCH confirms that the proposed CDM project activity is not common practice in the region.

3.8 Monitoring plan (124)

BVCH hereby confirms that the monitoring plan complies with the requirements of the methodology.

The steps taken to assess whether the monitoring arrangements described in the monitoring plan are feasible within the project design are described below.

The validation team had carried out a visit to the site of the project activity initially on 01.07.2008 & 02.07.2008. As the project activity was later commissioned and went into operation from 14.04.2009 onwards, a follow-up site visit was also carried out on 17.10.2011 to observe the actual monitoring arrangements being practised at the site. The team was also accompanied by the sectoral technical expert on 17.10.2011.

The validation team made the following observations at the site:

Baseline emissions:

Electricity generated by the project activity (EG_{PJy}):

- The parameter $EG_{PJ,y}$ is monitored by the export meter installed at the switchyard. There are two main meters and also two check meters. The check meters are used for confirmation of the main meter readings and also acts as a standby for the main meters. These meters are installed in a metering room near the switchyard. The main meters are owned by GVK Industries, while the check meters are owned by the AP TRANSCO. Both main and check meters are bi-directional (i.e. capable of measuring electricity exports by the plant to the grid as well as imports from the grid) $EG_{PJ,y}$ is a calculated parameter, being the difference between the electricity exports and imports by the plant to and from the grid. The monthly electricity exports and imports of the plant are recorded in Joint Meter Readings taken by APTRANSCO in the presence of GVK's representatives.
- $EG_{PJ,y}$ is calculated as the difference between $EG_{export,y}$ and $EG_{import,y}$ both of which are monitored continuously and recorded on a monthly basis. The monitoring frequency meets the requirement specified (hourly/yearly) in the monitoring methodology of the Tool to calculate the emission factor of an electricity system v2.2.1, which the AM 0029 monitoring methodology refers to.

- The monitoring plan in the PDD also includes $EG_{import,y}$ which is the electricity import by the project activity from the grid during start-up of the power plant. Although this parameter is not specified by the AM 0029 methodology or by the monitoring methodology of the Tool to calculate the emission factor for an electricity system (v2.2.1), the inclusion of this parameter in the monitoring plan ensures that grid emissions occurring due to electricity imports by the project activity under start up or other exceptional circumstances such as plant shut downs, etc. get accounted for; thereby leading to a conservative calculation of the emission reductions.

Project emissions:

1. Annual quantity of natural gas consumed in the project activity ($FC_{NG,y}$) – This parameter is monitored on-line by 2 gas flow meters (one each on line 1 & line 2 of the gas lines) installed by the gas supplier, GAIL, at the project site within the GAIL control room. The GAIL control room is located within the project boundary and the quantity of natural gas supplied is recorded by representatives of the Project Participant and GAIL on an hourly basis, which is at a frequency higher than specified in the methodology. The monitoring itself is under GAIL's control. There is a further provision of additional gas flow meter (turbine flow meter) in the gas turbine container room of the PP, to monitor the gas flow. The purpose of this additional meter is only to serve as a cross-check or to be used in lieu of any error or unavailability of the GAIL meter in the control room.
2. Net Calorific Value of natural gas ($NCV_{NG,y}$): Gas Calorific value measurements are recorded on daily basis by gas supplier GAIL in Daily Joint ticket reports. These reports are signed jointly by GAIL and GVK representatives. The reports are generated on daily basis by the GAIL and made available to the Project Participant. The recording frequency (daily) is higher than indicated in the methodology (fortnightly). The monitoring is on –line by means of gas calorimeter and takes place at the GAIL control room. The monitoring equipment as well as the monitoring itself is under the control of GAIL.

   The validation team also checked fuel invoices of the gas supplier GAIL and found that the same contained the values of NCV of the fuel used.
3. Oxidation factor ($OXID_{NG}$): the IPCC default value for oxidation factor of natural gas is used in the monitoring plan by the Project Participant which is as per the methodology.

4. Emission factor for Natural Gas ($EF_{CO2,NG,y}$): the value of this factor is taken from Table 1.4, Chapter 1, Volume 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, as supplier provided local data is not available. This is as per the methodology which has prescribed the order of preference as local/regional/global (IPCC). The country-specific value of $EF_{CO2,NG,y}$ was confirmed by the validation team from the Ministry of Environment & Forests publicly accessible web site moef.nic.in/downloads/public-information/Report_INCCA.pdf , to be 56.1 tCO2/TJ , which is the same as the IPCC value.
5. CO2 emission coefficient (COEFy): this is calculated from the values of EFCO2,NG,y, $NCV_{NG,y}$ and $OXID_{NG}$ and is as per the methodology
6. Project emissions (PEy): the project emissions are calculated, as per the requirements of methodology , from monitored values of $FC_{NG,y}$ and $COEF_{NG,y}$ and is hence as per the monitoring methodology.
7. The baseline emission factor ($EF_{BL,Co2,y}$) is determined as corresponding to Option I described in the methodology and is the build margin. As the methodology requires the ex-post determination of this factor, the same is also included as a monitoring parameter in the monitoring plan of the PDD in section B.7.1. The monitoring frequency of $EF_{BL,Co2,y}$ in the monitoring plan is “annual” which is as per the monitoring methodology of the Tool to calculate the emission factor for an electricity system v2.2.1

Leakage emissions: The baseline emission factor for upstream fugitive methane emissions factor EFBL,upstream,CH4 is also included in the monitoring plan in B.7.1 of the PDD. This parameter is not a part of the monitoring methodology of AM 0029. However, by including the parameter within the monitoring plan, the baseline upstream fugitive methane emissions would be calculated and accounted for every year. The baseline emission factor $EF_{BL,CO2,y}$ is also an ex-post monitored parameter. By opting to include EF_{BL}, upstream,CH_4 also in the monitoring plan, it is therefore ensured that the value of net emission reductions that will be calculated is based on changes in both these factors taking place every year. Hence, the validation team accepts the inclusion of this parameter in the monitoring plan of the PDD.
Calibration of monitoring equipment:

- The responsibilities for calibration of monitoring equipment at the plant are designated as under :
    a) Electricity main & check meters at the switchyard that monitor electricity exports & imports to & from the grid: approved third party testing agencies such as Electronic Test & Development Centre, Govt. of India.

b) Gas flow meter at the GAIL skid: the responsibility for carrying out the calibration rests jointly with GAIL and the Project Participant.

c) Gas flow meter installed within the gas turbine container room of GVK's plant: GVK Industries Ltd.

d) Gas calorimeter at the GAIL skid: GAIL.

On the basis of the above observations made at the site, the validation team confirms that the monitoring arrangements described in the monitoring plan of the PDD are feasible within the project design.

The essential monitoring parameters as required by the methodology were not included in the monitoring plan of the web hosted PDD. These were included in the revised PDD in response to CAR-10, 11, and CL 4 and 11 that were raised.

The validation team also interacted with the project participant's representatives at the site. The project activity is managed by a competent team and the responsibilities for implementation of the project activity such as data verification, recording, storage and archiving have been allocated at different levels in the team. The implementation responsibilities are also shared by competent O & M personnel appointed by GVK. The validation team confirms from its site observations and its interviews with the site personnel that the project participant possesses the necessary ability to implement the monitoring plan as described in the PDD.

BVCH hereby confirms that the project participants are able to implement the monitoring plan.

3.9 Sustainable development (127)

The host Party's DNA confirmed the contribution of the project to the sustainable development of the host Party. An assessment of the same is provided in section 3.1 of this report. The project participant described contribution to sustainable development as per four indicators of sustainable development stipulated by Ministry of Environment & Forests in India. Project participant has obtained approval (Ref/1/) from DNA of India and it is confirmed by the DNA that the project activity contributes to sustainable development in India. The project activity is in compliance with all current applicable legislations. The project activity does not lead to generation of liquid or harmful gaseous effluents and it will displace fossil fuel based electricity generation.

Hence, there are only benefits derived out of the project and no adverse effects are envisaged. Moreover, the location of the project activity is in a remote and economically backward region and hence largely contributes to the social well being of the region. During the site visit it was noticed that the project provided substantial employment to local residents of nearby villages.

In the web hosted PDD, there were two project participants listed, viz., GVK Industries Ltd. and Cantor Fitzgerald Europe. The validation team requested the project participant to clarify if DNA approval had also been obtained fro the second project participant, i.e. Cantor Fitzgerald. IN response to the clarification request CL-1 that was raised, it was explained by the project participant that the HCA had been received in the name of GVK Industries Ltd. The name of Cantor Fitzgerald has subsequently been removed in the revised PDD. Hence, the CL-1 was closed.

The host Party's DNA has also confirmed the contribution of the project to the sustainable development of the host country through the Host Country Approval Letter issued by it.

3.10 Local stakeholder consultation (130)

The steps taken to assess the adequacy of the local stakeholder consultation are described below.

During the initial site visit carried out by members of the validation team on 01.07.2008 & 02.07.2008, a meeting was held with the local stakeholders to verify the process of consultation described by the project participant in the section E.1, E.2 & E.3 of the PDD. The team verified through personal interviews carried out with the local stakeholders that
a stakeholder consultation had indeed been carried out by the project participant on 01/12/2007, at which local villagers, a local NGO, Government officials and employees working at GVK's power plant had been invited
Prior to this, written invitations had been sent to the local stakeholders for the meeting that was planned on 01.12.2007. The validation team verified the original of the invitation memo that was sent and also the acknowledged memos from some of the local stakeholders
The stakeholders informed the validation team that they had received sufficient notice in advance of the said meeting
The local villagers who were interviewed by the validation team informed them that the consultation process was held in an open manner and they were given sufficient and relevant information about the project activity.
The local stakeholders interviewed also informed that queries raised by them at the consultation meeting were responded to by the project participant in a satisfactory manner.

The validation team verified the following documents :
the list of participants at the meeting held together with their respective signatures
A copy of the meeting summary and the original were also verified by the validation team and found to be in order
In the web hosted PDD, names of the stakeholders who offered their comments during the stakeholder consultation process had omitted. The same were included in the revised PDD in response to CAR-9 raised during the validation.

The validation team, on the basis of the above confirms that the process of local stakeholder consultation is observed to be adequate.

3.11 Environmental impacts (133)

The Ministry of Environment & Forest (MoEF) in India requires that an Environmental Impact Assessment (EIA) be carried out by the project participant prior to establishing the project activity at the designated site. In accordance with the same, a Rapid Environment Impact Assessment was carried out by the project participant. A copy of the report was shared with the validation team. The team has noted that the Rapid EIA assessment report was prepared by the agency Vimta Labs Ltd (Ref/37/) and in the same; the environmental impacts on the soil, air quality and the ecology of the surrounding area have been adequately discussed. An Environment Management Plan (EMP) was also prepared to minimize the potential environmental impacts arising out of the proposed project activity.

The project activity has obtained all the statutory permissions required to establish and operate the project activity such as
the Environmental Clearance from the MoEF (Ref/65/)
the Consent to establish the plant issued by the MoEF
The Consent to Operate the plant issued by the State Pollution Control Board of Andhra Pradesh
The validation team has been provided copies of the above statutory approvals and permissions. The copies were vetted against their originals and found to be a replica of the same.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD using methodology AM 0029 was webhosted on the UNFCCC for global stake-holders comments as per CDM requirements. The project was webhosted from 31/05/2008 to 29/06/2008[15].

No comments were received during the webhosting period.

[15] http://cdm.unfccc.int/Projects/Validation/DB/82ORS4DFFAE3F7JI64VMOSYQEYXGCB/view.html

5 VALIDATION OPINION

Bureau Veritas Certification has performed a validation of the project activity "Combined cycle natural gas based grid connected power plant at Jegurupadu, India" in India. The validation was performed on the basis of UNFCCC criteria and host country criteria and also on the criteria given to provide for consistent project operations, monitoring and reporting.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

Project participant/s used the latest tool for demonstration of the additionality. In line with this tool, the PDD provides an analysis of the investment, to determine that the project activity itself is not the baseline scenario.

By synthetic description of the project, the project is likely to result in reductions of GHG emissions partially. An analysis of the investment in the project activity demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity. Given that the project is implemented and maintained as designed, the project is likely to achieve the estimated amount of emission reductions, viz, 448,988 tCO_2e annually.

The review of the project design documentation (version 5.4) and the subsequent follow-up interviews have provided Bureau Veritas Certification with sufficient evidence to determine the fulfillment of stated criteria. In our opinion, the project correctly applies and meets the relevant UNFCCC requirements for the CDM and the relevant host country criteria. Bureau Veritas Certification thus requests registration of **'Combined cycle natural gas based grid connected power plant at Jegurupadu, India'** as CDM project activity.

6 REFERENCES

Category 1 Documents:
Documents provided by Type the name of the company that relates directly to the GHG components of the project.

/1/ Webhosted PDD, Version 02, dated 30/05/2008
/2/ Final revised PDD, Version 06, dated 16/07/2012
/3/ Application by GVK vide GVK/02/D(T)/MoEF/2008/050 dated 12/06/2008 for Host Country Approval
/4/ Letter of invitation from the Ministry of Environment and Forests to the project participant for HCA dated 14/07/2008
/5/ Host Country Approval File No. 4/13/2008-CCC dated 03/09/2008
/6/ Commissioning Certificate issued by Andhra Pradesh Power Co-ordination Committee vide CE/IPC/112/F.GVKCOD/D:No30/09 dated 13/05/2009 for the COD dated 14/04/2009
/7/ Letter issued by the Andhra Pradesh Power Co-ordination Committee vide CE/IPC/112/F.GVK-PAT/D.No.73/09 dated 14.07.2009
/8/ EPC quote from Alstom to GVK Industries Limited dated 07/03/2001
/9/ Project Note dated 10/01/2003 prepared and circulated by GVK Industries Ltd to the Board of Directors
/10/ Certified copy of Extract of Minutes of Board Meeting dated 28/02/2003
/11/ Draft PPA signed between GVK Industries Ltd and Transmission Corporation of Andhra Pradesh Limited dated 30/11/2001
/12/ IDBI Letter of Intent for Loan Application to GVK vide HO.PAD.35A (GVK)761-1-309 dated 04/05/2001
/13/ APERC Order O.PNo.4/2002 dated 12/04/2003
/14/ APERC order O.P. No.179 of 2003 dated 08/04/2003
/15/ CERC tariff order in the metter of determination of terms and conditions of tariff applicable from 01.04.2004
/16/ Notice to proceed by GVK Industries to Alstom Projects India Ltd dated 14/01/2004
/17/ Contract for Supplies, Services in between GVK Industries Ltd and ALSTOM Ltd dated 14/06/2003
/18/ Gas Supply Agreement between GAIL and GVK Industries Limited dated 05/10/1999
/19/ Allocation of Natural Gas to GVK Industries Ltd by Ministry of Petroleum and Natural Gas (MoPNG) vide letter No L -120/1/7/98-GP dated 08/07/1999
/20/ Gas transportation agreement between Reliance Gas Transportation Infrastructure Limited and GVK Industries Ltd dated 17/04/2009
/21/ Gas Sales and Purchase Agreement between Reliance Industries Limited and Niko (NECO) and GVK Industries Ltd dated 17/04/2009
/22/ Letter from GAIL to GVK Industries Ltd. Ref GAIL/HZO/MKTG/Ravva satellite/1 dated 10/03/2003

/23/ Chartered Engineer Certificate for plant performance vide letter PVR/Jegurupadu/99/09/ 99 dated 06/09/2011

/24/ PPA signed between GVK Industries Ltd and Transmission Corporation of Andhra Pradesh Limited dated 18/06/2003

/25/ Proposed Amendment Agreement to Power Purchase Agreement of GVK Industries Ltd. with power distribution companies of Andhra Pradesh dated 26/05/2008

/26/ Operation and Maintenance Agreement between GVK Industries Ltd and GVK Power and Infrastructure Ltd dated 13/10/2005

/27/ Sample copy of Daily Gas Supply Receipt issued by GAIL called as Daily Joint Ticket jointly signed by representative of Project participant and representative of GAIL

/28/ Infraline's paper on Natural Gas for Power sector: issues and challenges

/29/ News Clipping of the Press Information Bureau of the Government of India from the newspaper daily DNA dated 04.12.2006

/30/ News article in the Economic Times dated 04.12.2008

/31/ "The future of natural gas in India : a study of major consuming sectors" working paper published by Program on energy & Sustainable Development (P.E.S.D.) of Stanford University dated October 2007

/32/ Plant Layout Drawing of GVK Industries 228MW CCP released on 10/09/2003

/33/ Common Loan Agreement between GVK Industries Ltd and ICICI Bank Ltd (acting as a facility Agent) dated 20/11/2003

/34/ Working Capital Loan Sanction by State Bank of India vide AMT-III-85 dated 23/08/2002

/35/ Price notification No. 7/2001-2002 dated 9th April 2001 of the Singareni Collieries Co. Ltd., Hyderabad

/36/ Minutes of Meetings of Local Stakeholders Consultation held in GVK Plant premises dated 01/12/2007

/37/ Rapid EIA study Report by Vimta Labs Limited, Hyderabad dated January 1999

/38/ Sample copy of Plant log book

/39/ Financial Spreadsheet for Levelised Cost for Coal and Levelised cost and IRR for Natural Gas

/40/ Estimation Spreadsheet of Emission Reduction

/41/ Common Practice illustration spreadsheet titled "Common practice analysis"

/42/ Sample copy of Invoice for the gas supply

/43/ Monthly heat rate data by Gas Turbine Thermal Power Stations (Annexure-1) for the years 2009-10 & 2010-11

/44/ Provisional Bill raised by GVK Industries Ltd, for the period Aug 10, 2011 to September 10 , 2011.

/45/ Amendment agreement (dated 26.05.2008) to the Power Purchase Agreement for the gas based power project between GVK Industries Ltd. and state power distribution companies.

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents.

/46/ PDD completion guidance - Guidelines for completing the project design document (CDM-PDD) and the form for proposed new baseline and monitoring methodologies (CDM-NM), version 07, EB 41 Annex 12

/47/ CDM PDD Form, (CDM –PDD), Version 3

/48/ AM 0029 - Version 3 Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas

/49/ Tool for the demonstration and assessment of additionality, Version 006, EB 65 Annex 21

/50/ Guideline on the Assessment of Investment Analysis, Version 5, EB 62, Annex 5

/51/ Tool to calculate the emission factor for an electricity system - version 2.2.1

/52/ CDM Glossary version 5, EB 47

/53/ Guidelines on the demonstration and assessment of prior consideration of the CDM, version 4, EB 62 Annex 13

/54/ Guidelines on Common Practice, EB 63 Annex 12

/55/ CEA CO_2 baseline database for Indian power sector version 3 dated 15 December 2007

/56/ CERC Notification vide ref no L-7/25(1)/2001-CERC, dated 26/03/2001

/57/ CERC Notification vide ref no L-7/25(5)/2003-CERC, dated 26/03/2004

/58/ PPA signed between Vemagiri Power Generation Ltd and AP Transco dated 12/04/2003

/59/ IPCC Guidelines for National Greenhouse Gas Inventories- 2006

/60/ VVM version 1.2 EB 55 Annex 1

/61/ Minutes of meeting dated 04/01/2003 between GVK Industries Ltd and PwC

/62/ ERPA signed between GVK Industries Ltd and Rotec Industries dated 11/02/2005

/63/ Memorandum of Understanding between GVK Industries Ltd and CO_2.e.com London

/64/ Contractual Agreement between BVCH and GVK Industries Ltd vide GVK/02/D(T)/BVI/2008/018 dated 09/02/2008

/65/ Ministry of Environment and Forest, Environmental Clearance vide J/130011/17/97/-IA.II(T) dated 24/06/1997

/66/ Gazette of India Extraordinary published by Ministry of Power, Notification dated 26/03/1994

Persons interviewed:

List persons interviewed during the validation or persons that contributed with other information that are not included in the documents listed above.

/1/ Mr. G Madhava Reddy, Vice President (Finance), GVK Industries Ltd

/2/ Mr. Shashidhar Raju, GVK Industries Ltd

/3/ Mr. N Srinivasa Rao, General Manager (Plant), GVK Industries Ltd

/4/ Mr. Gopala Krishna, Sr. Operations Manager (Plant),GVK Industries Ltd.

/5/ Mr. Amir Basha, Deputy Manager (Electrical)(Plant),GVK Industries Ltd.

/6/ Mr. Pravin Babu, Technician (O&M),GAIL

/7/ Mr. Satish Kashyap, Director, General Carbon Advisory
/8/ Mr. Pravin Jadhav, General Carbon Advisory
/9/ Ms. Manali Mane, General Carbon Advisory

7 CURRICULA VITAE OF BVCH'S VALIDATION TEAM MEMBERS

Mr. Sanjay Patankar (Team Leader): Bureau Veritas Certification, Climate Change -Lead Verifier,
Educational qualifications: B.E. (Mech.) M.E. (Mech.)
He has over 20 years of experience in engineering manufacturing industry covering various functions like enterprise management, product design, engineering, tool & die design, improvements in the production shop, quality assurance & control and systems planning and implementation, including ISO 9001 based quality management systems. He is working for the last 4 years in Bureau Veritas Certification (India) Pvt. Ltd. as Lead Verifier for CDM and also Lead Auditor for ISO 9001, 14001 and OHSAS 18001 standards/specifications. Has undergone training related to Clean Development Mechanism and is currently involved in validation and verification of CDM project activities.

Mr. R. Reghukumar (Team Leader)
GHG Lead Validator, Bureau Veritas Certification
Post graduate in Environmental Engineering, Management and certified Project Management Professional from PMI, Pennsylvania, USA, with over two decades of work experience, which include teaching, Environmental Management & Monitoring as part of the environmental regulatory authority and Management system auditing with exposure to variety industrial processes. He has been involved in validation / verification of CDM projects.

Mr. R S Prem Kumar: **(Team member)**
Bureau Veritas Certification Climate Change Lead Verifier
Lead auditor in Bureau Veritas Certification for Environment Management System, Quality Management System and Occupational Health and Safety Management System. Graduate in the field of Environmental Engineering and has more than 12 years of Industrial work experience in the field of environmental and occupational safety management systems. He has undergone intensive training on Clean Development Mechanism. He is involved in the Validation/verification for more than 25 CDM projects and is also involved in the successful registration /issuance of a number of CDM project activities in the capacity of a Team Leader.

Mr. P. Srinivas (Team member)
GHG Lead Validator, Bureau Veritas Certification

Graduate in Mechanical engineering wi th 12 years of experience in Pharmaceutical & Chemical industries, in Projects, Operation & Maintenance of Utilities, Plant Maintenance, TPM, MIS and ISO systems. Involved in many improvement projects in the plant, which are related to Energy conservation, Steam and power saving projects, Air cleaners, Raw material stock optimization, manpower optimization. Lead Verifier for CDM projects, Lead auditor in QMS & EMS and Tutor for QMS. Involved in validation /Verification of CDM projects.

Ms. Sapana S Pednekar (Team member)

Bureau Veritas Certification, Climate Change Lead Verifier
She is a Post Graduate in Environmental Science from University of Pune, India. She has total Industrial work experience of 6 years in the field of environmental studies of which more than 2 years experience was in the field of CDM and VCS consulting. She is working in Bureau Veritas Certification (India) Pvt. Ltd. for more than one year and has undergone training related to Clean Development Mechanism and is currently involved in validation and verification of CDM/ VCS project activities.

Mr. D. Sadashiva Bhat, Independent Technical Specialist
Educational Qualifications: B.E. (Mechanical)
He has over 32 years experience in maintenance operations, quality control, installation, erection, and commissioning & man management in thermal power plants of the Karnataka Power Corporation Ltd. The experience includes implementing cost saving measures to achieve substantial reduction in terms of production, raw materials, manpower and machine utilization and customer satisfaction. Experience in maintenance/operations of a wide spectrum of equipment and components in thermal power plants, including preventive and breakdown maintenance. He has worked in Raichur thermal power plant in Karnataka, India

Mr. H.B. Muralidhar, Internal Technical Reviewer
Bureau Veritas Certification, Climate Change Lead Verifier
He is a Graduate in Electrical Engineering with 25 years of experience power generation and distribution related fields as well as in management system auditing. Lead auditor in Bureau Veritas Certification for Environment Management System, Quality Management System and Occupational Health and Safety Management System. He is the Lead auditor for Environmental Management System, Quality Management system and Occupational Health and Safety Management System. He has undergone intensive training on Clean Development Mechanism. He is the technical expert & conducted Validation / Verification for more than 50 CDM Projects.

VALIDATION PROTOCOL

Table 1 Validation requirements based on the Clean Development Mechanism Validation and Verification Manual (Version 01.2)

CHECKLIST QUESTION	Ref.	§	COMMENTS		Draft Concl	Final Concl
1. Approval			***COUNTRY A (INDIA))***	***COUNTRY B (Not applicable)***		
a. Have all Parties involved approved the project activity?	VVM	44	Yes, the host party has approved the project activity vide its letter no. 4/13/2008-CCC dtd. 3rd September 2008.	---	**OK**	OK
b. Has the DNA of each Party indicated as being involved in the proposed CDM project activity in section A.3 of the PDD provided a written letter of approval? (If yes, provide the reference of the letter of approval, any supporting documentation, and specify if the letter was received from the project participatn or directly from the DNA)	VVM	45	As per the webhosted PDD, section A.3, the second project participant Cantor Fitzgerald Europe is indicated. However, it is not clear whether this project participant has obtained the DNA approval from the host party ie, United Kingdom.	---	**CL 1**	OK
c. Does the letter of approval from DNA of each Party involved:	VVM	45		---		
i. confirm that the Party is a Party of the Kyoto Protocol?	VVM	45.a	Yes, Government of India has ratified Kyoto Protocol in 2002 and the letter also	---	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS		Draft Concl	Final Concl
			confirms the same.			
ii. confirm that participation is voluntary?	VVM	45.b	Yes, HCA confirms that the participation of PP is voluntary	---	**OK**	OK
iii. confirm that, in the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country?	VVM	45.c	Yes. It is been mentioned about the sustainable development in the HCA	---	**OK**	OK
iv. Refers to the precise proposed CDM project activity title in the PDD being submitted for registration?	VVM	45.d	Project activity in the letter of approval from Indian DNA is matching with the title in the PDD	---	**OK**	OK
d. Is(are) the letter(s) of approval unconditional with respect to (i) to (iv) above?	VVM	46	Yes the letter of approval is unconditional		**OK**	OK
e. Has(ve) the letter(s) of approval been issued by the respective Party's designated national authority (DNA)and is valid for the CDM project activity under validation?	VVM	47	Yes, HCA certificate is been issued by DNA on 03 Sept 2008.	---	**OK**	OK
f. Is there doubt with respect to the authenticity of the letter of approval?	VVM	48	There is no doubt with respect to the authenticity of letter of approval and it was verified from the official website of Indian DNA http://www.cdmindia.in/reports_list_details.php?id=Andhra%20Pradesh&reporttype=2&page=3 and it confirms the approval of the project with project ID	---	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS		Draft Concl	Final Concl
			no 1040-08.			
g. If yes, was verified with the DNA that the letter of approval is authentic?	VVM	48	Not Applicable	--	**OK**	OK
2. Participation			*GVK Industries Ltd*	*PP2 (Not Applicable)*		
a. Have all project participants been listed in a consistent manner in the project documentation?	VVM	51	Yes, the project participant is GVK Industries Ltd. Hyderabad, and is listed in a consistent manner in the PDD in the sections A.3 and in the Annexe 1 at the end of the PDD.	--	**OK**	OK
b. Has the participation of the project participants in the project activity been approved by a Party to the Kyoto Protocol?	VVM	51	Yes it has approved by India which is a party to Kyoto Protocol	--	**OK**	OK
c. Are the project participants listed in tabular form in section A.3 of the PDD?	VVM	52	The project participant is GVK Industries Ltd and it is mentioned in tabular format in section A.3 of the PDD.	---	**OK**	OK
d. Is the information in section A.3 consistent with the contact details provided in annex 1 of the PDD?	VVM	52	The information provided in the section A.3 of the PDD is consistent with Annex-I of PDD.	--	**OK**	OK
e. Has the participation of each of the project participants been approved by at least one Party involved, either in a letter of approval or in a separate letter specifically to approve participation? (Provide reference of the approval	VVM	52	There is only one project participant in the project activity and has been approved by above mentioned letter.	---	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
document for each of the project participants)					
f. Are any entities other than those approved as project participants included in these sections of the PDD?	VVM	52	There are no other entities included in A.3 and Annex-I of PDD	**OK**	OK
g. Has the approval of participation issued from the relevant DNA?	VVM	53	The approval of participation is issued by DNA of India.	**OK**	OK
h. Is there doubt with respect to (g) above?	VVM	53	, there is no doubt about the authenticity of HCA as the Indian DNA website also indicates the approval status of the project.	**OK**	OK
i. If yes, was verified with the DNA that the approval of participation is valid for the proposed CDM project participant?	VVM	53	Not Applicable	**--**	OK
3. Project design document					
a. Is the PDD used as a basis for validation prepared in accordance with the latest template and guidance from the CDM Executive Board available on the UNFCCC CDM website?	VVM	55	Latest template CDM-PDD version 03 – in effect as of 28 July 2006 has been used. Current PDD version no 05.3 dated 18/10/2011 is also in the same PDD format.	**OK**	OK
b. Is the PDD in accordance with the applicable CDM requirements for completing the PDD?	VVM	56	The PDD Is completed as per The Guidelines For Completing The Project Design Document (CDM-PDD) version 7 , EB 41, Annex 12	**OK**	OK
c. In CDM-PDD section A.1 are the following provided?	EB 41	Ann 12			
i. Title of project	EB 41	Ann 12	Title of the project activity is 'Combined cycle natural gas based grid connected power plant at Jegurupadu, India.'	**OK**	OK
ii. Current version number and date of document	EB 41	Ann 12	The webhosted PDD's Version is 02 and date was given as 30/05/2008. The latest PDD available with BVCH is of Version 05.1 and dated is provided as 18/10/2011.	**OK**	OK
d. In CDM-PDD section A.2 are following provided	EB	Ann			

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(max. one page)?	41	12			
i. A brief description of the project activity covering purpose which includes the scenario existing prior to the start or project, present scenario and baseline scenario	EB 41	Ann 12	i. As per the web hosted PDD, the proposed project activity is a 220 MW Natural Gas fired combined cycle power plant which will comprise of one combustion turbine, one Heat recovery Steam Generators (HRSG) and one Steam Turbine Generator (STG). The purpose of the project and the pre and post project scenarios are not clearly defined in the PDD. ii. It is also noticed that the installed capacity is 228 MW, whereas in PDD and other approvals and financial working it is said as 220 MW.	**CAR 1**	OK
ii. Explanation on how the GHG emission reductions are effected	EB 41	Ann 12	The revised PDD, Section A.2 explains how the emission reductions are achieved due to the project activity.	**OK**	OK
iii. The PP's vies on the contribution of project activity to sustainable development	EB 41	Ann 12	Yes, it is mentioned in PDD	**OK**	OK
iv. Are there any changes/modifications compared to the webhosted PDD?	EB 41	Ann 12	Yes there were changes/modifications compared to the webhosted PDD. The capacity of the project activity in the webhosted PDD was given to be 220 MW where as on verification of various documents and raising of CAR in the course of validation the capacity of the project activity was revised to 228 MW based on the relevant documents validated by the project participant. The pre – project scenario is also now incorporated in the revised PDD.	**OK**	OK
e. In CDM-PDD section A.3 are following provided in the tabular format?	EB 41	Ann 12			
i. List of project participants and parties	EB 41	Ann 12	The project participant is given as GVK Industries Limited.	**OK**	OK
ii. Identification of Host Party			Host Party is mentioned as India	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
iii. Indication whether the Party wishes to be considered as project participant	EB 41	Ann 12	Host party does not wish to be the project participant.	**OK**	OK
f. In CDM-PDD section A.4.1 are following provided?	EB 41	Ann 12			
i. Technical description, location, host party(ies) and address as required	EB 41	Ann 12	Technical description is covered in section A.4.2. Location, host party and address are given	**OK**	OK
ii. Detailed physical location with unique identification of the project activity (eg. Longitude/latitude) – not to exceed one page	EB 41	Ann 12	Latitude – longitude are provided in the PDD. The information provided is with in the limit of one page.	**OK**	OK
iii. Are there any changes/modifications compared to the webhosted PDD?	EB 41	Ann 12	Yes there was change/ modifications in the name of the project participant as compared to the webhosted PDD. The modification is based on Clarification request raised by the validation team.	**OK**	OK
g. In CDM-PDD section A.4.2 is the list of categories of project activities provided?	EB 41	Ann 12	The sectoral scope and project category are not clearly defined in section A.4.2.	**CAR 2**	OK
h. In CDM-PDD section A.4.3 are following provided?	EB 41	Ann 12			
i. A description of how environmentally safe and sound technology, and know-how, is transferred to the Host Party(ies)	EB 41	Ann 12	The environmentally safe and sound technology description is mentioned in the PDD. The technology involved is combined cycle electricity generation system. However it is not clear if there will be supplementary firing in HRSG.	**CL 2**	OK
ii. Explanation of purpose of project activity with scenario existing prior to the start of project, scope or present activities and the baseline scenario	EB 41	Ann 12	Details on baseline, purpose of project activity are mentioned in section. The project participant requested to clarify if the alternate fuels or combination of fuels are envisaged in the project	**CL 3**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			activity		
iii. List and arrangement of the main manufacturing/production technologies, systems and equipments involved	EB 41	Ann 12	Project participant needs to clarify how it is ensured that the natural gas would be the primary fuel to be used in the project activity at all times	**CL 4**	OK
iv. The emissions sources and GHGs involved	EB 41	Ann 12	Yes, provided in the PDD	**OK**	OK
v. Are there any changes/modifications compared to the webhosted PDD?	EB 41	Ann 12	Yes there are changes based on response to CAR/CLs raised in above sections	**OK**	OK
i. In CDM-PDD section A.4.4 is the estimation of emission reductions provided as requested in a tabular format?	EB 41	Ann 12	Yes, estimation of emission reductions as per the tabular format is provided	**OK**	OK
j. In CDM-PDD section A.4.5 is Information regarding Public funding provided?	EB 41	Ann 12	Yes the details are provided regarding ODA funding	**OK**	OK
k. In CDM-PDD section B.1 are following provided?	EB 41	Ann 12			
i. The approved methodology and version number	EB 41	Ann 12	Yes, the approved methodology and version are mentioned in the section B.1	**OK**	OK
ii. Any methodologies or tools which the above approved methodology draws upon and their	EB 41	Ann 12	Tool for assessment of Additionality and tool to calculate Emission factor for an electricity system is used.	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
version noumber					
l. In CDM-PDD section B.2 are following provided?	EB 41	Ann 12			
i. Justification ot the choice of methodology that the project activity meets each of the applicability conditions	EB 41	Ann 12	Yes, justification of choice of methodology is mentioned in tabular format in section B.2	**OK**	OK
ii. Documentations with references that had been used. This can be provided in Annex 3 instead	EB 41	Ann 12	Baseline information provide in Annex 3	**OK**	OK
m. In CDM-PDD section B.3 are following provided?	EB 41	Ann 12			
i. Description of all sources and gases included in the project boundary in the table	EB 41	Ann 12	Yes, the description of all sources and gases included in the project boundary are provided in tabular form	**OK**	OK
ii. A flow diagram of the project boundary physically delineating the project activity	EB 41	Ann 12	The project boundary is not demarcated in section B.3 of the PDD**.**	**CAR 3**	OK
iii. The flow diagram with all equipments, systems and flows of mass and energy etc	EB 41	Ann 12	The PDD presents theflow diagram indicating all the equipments, systems is provided.	**OK**	OK
n. In CDM-PDD section B.4 are following provided?	EB 41	Ann 12			
i. Explanation how the most plausible baseline scenario is identified in accordance with the selected baseline methodology	EB 41	Ann 12	How the most plausible baseline scenario is identified is not explained. The options of power generation using fuels other than coal are not identified and discussed.	**CAR 4**	OK
ii. Justification of key assumptions and rationales	EB 41	Ann 12	The deviations observed were raised as CAR/CL in following sections	**--**	OK
iii. Transparent illustration of all data used to determine the baseline scenario (variables, parameters, data sources, etc.)	EB 41	Ann 12	The deviations observed were raised as CAR/CL in following sections	**--**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
iv. A transparent and detailed description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed project activity	EB 41	Ann 12	• Footnote 8 is missing, • Web link provided in Footnote 11 is not correct, please provide the correct link • Web link in footnote 14, 19, 25, 28 doesn't open	**CAR 8**	OK
v. Are there any changes/modifications compared to the webhosted PDD?	EB 41	Ann 12	Yes based on CAR/CLs raised there are changes to the sections	**OK**	OK
o. In CDM-PDD section B.5 are following provided?	EB 41	Ann 12			
i. Explanation of how and why this project activity is additional and therefore not the baseline scenario in accordance with the selected baseline methodology	EB 41	Ann 12	The prior history of the project activity indicates action taken towards setting up the project. It is learned from various documents submiited by the project participant that: • The expansion of the previously existing 216MW gas based plant at the same site was in state of planning from 1996-97 • On 08/07/99, MoP and NG allocated 1.1MCMD gas supply that would have partly covered the requirements for the 360MW expansion • Environmental Clearance was accorded to GVK for setting up power plant of capacity 235 MW on 24 June 1997 • APPCB accorded its consent to GVK on 20/04/2000 to establish the Gas based plant • The draft PPA was submitted to GVK by AP Transco on 05/12/2001 which stipulated the	**CL 17**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			nominal installed capacity to be 220 MW and the primary fuel as Natural Gas • On 19/12/2002, the public hearing was conducted by APERC for PPA of gas based plant In the view of the above events taken place, please clarify the actual date of decision for this project activity as the Board Resolution to set up the project activity came later on 28/02/2003		
ii. Justification of key assumptions and rationales	EB 41	Ann 12	The project participant is requested to justify the consideration of coal based sub-critical power plant as a baseline alternative, given that a natural gas power plant of capacity 235 MW, owned by them at the same site was already in operation and actions taken by the project participant prior to the date of decision suggest that a capacity expansion of the same was being planned. An environmental public hearing was conducted by the Andhra Pradesh Pollution control Board on 07.12.1999, minutes of which are available as evidence. The minutes state that project participant was planning to set up 390 MW capacity plant in Phase-II (Phase I being the previous 235 MW plant) and the fuel requirement of this plant would be met through a mix of 72% natural gas and balance 28% naptha. There is no reference to coal based power plant. Justify on what basis a coal based power plant could be regarded as a credible alternative.	**CL 16**	OK
iii. Transparent illustration of all data used to determine the baseline scenario (variables, parameters, data sources etc)	EB 41	Ann 12	The webhosted PDD does not quote the supporting reference for the techno economic parameters of the project activity.	**CL 13**	OK

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iv. Evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity, if the starting date of the project activity is before the date of validation	EB 41	Ann 12	The chronology of events does not illustrate the project implementation schedule and progress of CDM related activities separately in the PDD, section B.5.	**CAR 17**	OK
p. In CDM-PDD section B.6.1 are following provided?	EB 41	Ann 12			
i. Explanation as to how the procedures, in the approved methodology to calculate project emissions, baseline emissions, leakage emissions and emission reductions are applied to the proposed project activity	EB 41	Ann 12	• The CEA data base used for determination of Emission Factor doesn't mention the version used • Calculation used to deduce the value for efficiency for the baseline plant is not provided	**CAR 9**	OK
ii. Equations used in calculating emission redutions	EB 41	Ann 12	The discrepancies observed were raised as CAR/ CL in above and below sections	**--**	OK
iii. Explanation and justification for all relevant methodological choices, including different scenarios or cases, options and default values	EB 41	Ann 12	The value of 160 tCH4/PJ taken by the PP pertains to USA & Canada and for the rest of the world it is given in the said table as 296 tCH4/PJ.	**CAR 7**	OK
q. In CDM-PDD section B.6.2 are following provided?	EB 41	Ann 12			
i. A compilation of information on the data and parameters that are not monitored throughout the crediting period but that are determined only once and thus remains fixed throughout the crediting period AND that are available when validation is undertaken	EB 41	Ann 12	*Project participant project participant is requested to justify the consideration of 85% PLF for the project activity.*	**CL 8**	OK
ii. The actual value applied	EB 41	Ann 12	OK, the actual value period is 2006-07 of CEA data for $EF_{BM,y}$, Build margin Emission factor and 2004-05,2005-06,2006-07 are the years taken for yearly Operating	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			Margin emission factor of Southern grid, where average is taken.		
iii. Explanation and justification for the choice of the source of data	EB 41	Ann 12	OK	**OK**	OK
iv. Clear and transparent references or additional documentation in Annex 3	EB 41	Ann 12	Yes, the transparent reference and additional documents reference is provided in Annex 3	**OK**	OK
v. Where values have been measured, a description of the measurement methods and procedures (e.g. which standards have been used), indicated the responsible person/entity having undertaken the measurement, the date of measurement(s) and the measurement results	EB 41	Ann 12	OK	**OK**	OK
r. In CDM-PDD section B.6.3 are following provided?	EB 41	Ann 12			
i. A transparent *ex ante* calculation of project emissions, baseline emissions (or, where applicable, direct calculation of emission reductions) and leakage emissions expected during the crediting period, applying all relevant equations provided in the approved methodology	EB 41	Ann 12	Yes, the calculations are as per the methodology AM0029, ver 3	**OK**	OK
ii. Documentation how each equation is applied, in a manner that enables the reader to reproduce the calculation	EB 41	Ann 12	Refer r.i above	**-**	
iii. Additional background information and or data in Annex 3, including relevant electronic files (i.e. spreadsheets)	EB 41	Ann 12	Refer r.i above	**-**	
s. In CDM-PDD section B.6.4 are the results of the	EB	Ann	Yes, estimation of ER is provided in tabular format	**-**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
ex ante estimation of emission reductions for all years of the crediting period, provided in a tabular format?	41	12			
t. In CDM-PDD section B.7.1 are following provided?	EB 41	Ann 12			
i. Specific information on how the data and parameters that need to be monitored would actually be collected during monitoring for the project activity	EB 41	Ann 12	Baseline emission factor $EF_{BL,CO2,y}$ is required by monitoring methodology to be monitored ex post. However, the same is not included in the monitoring plan in section B.7.1	**CAR 11**	OK
ii. For each parameter the following below information, using the table provided:	EB 41	Ann 12			
a. The source(s) of data that will be actually used for the proposed project activity (e.g. which exact national statistics). Where several sources may be used, explain and justify which data sources should be preferred.	EB 41	Ann 12	The monitoring arrangements are not described in detail in section B.7.2 of the PDD. The following parameters are not provided in section B.7.1 **1.** $FCf_{LNG,y}$ is not specified **2.** $OXID_{LNG}$ **3.** OXID $EF_{CO2,f,y}$ i $COEF_{i,y}$ and PE_y is also not specified	**CAR 12**	OK
b. Where data or parameters are supposed to be measured, specify the measurement methods and procedures, including a specification which accepted industry standards or national or international standards will be applied, which measurement equipment is used, how the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that	EB 41	Ann 12	Refer CAR rasied above	--	OK

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should undertake the measurements and what is the measurement interval; (i) A description of the QA/QC procedures (if any) that should be applied; (ii) Where relevant: any further comment. Provide any relevant further background documentation in Annex 4.					
u. In CDM-PDD section B.7.2 are following provided?	EB 41	Ann 12			
i. A detailed description of the monitoring plan	EB 41	Ann 12	Yes, the detail monitoring plan is provided in the PDD	**OK**	OK
ii. The operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects generated by the project activity	EB 41	Ann 12	The operational and management structure that will be implemented after commencing of the project is provided in the section B.7.2	**OK**	OK
iii. The responsibilities for and institutional arrangements for data collection and archiving	EB 41	Ann 12	Yes the responsibilities for and institutional arrangements for data collection and archiving are provided	**OK**	OK
iv. Indication that the monitoring plan reflect good monitoring practice appropriate to the type of project activity	EB 41	Ann 12	The monitoring plan is inline with the actual monitoring at the plant .	**OK**	OK
v. Relevant further background information in Annex 4	EB 41	Ann 12	The background information is provided in section B.7.2 of the PDD.	**OK**	OK
v. In CDM-PDD section B.8 are following provided?	EB 41	Ann 12			
i. Date of completion of the application of the methodology to the project activity study in DD/MM/YYYY	EB 41	Ann 12	Yes the date is provided in the DD/MM/YYYY format and the date is provided as 25/11/2010	**OK**	OK
ii. Contact information of the person(s)/entity(ies) responsible for the application of the baseline	EB 41	Ann 12	It is stated as the GVK Industries is the contact entity and its contact details are same as provided in Annex 1 of the	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
and monitoring methodology to the project activity			PDD.		
iii. Indication if the person/entity is also a project participant listed in Annex 1	EB 41	Ann 12	Yes GVK industries Ltd is project participant and it is listed in Annex 1	**OK**	OK
w. In CDM-PDD section C.1.1 are following provided?	EB 41	Ann 12			
i. The starting date of a CDM project activity, which is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun (EB33, Para 76/CDM Glossary of terms/EB41, Para 67)	EB 41	Ann 12	Yes, the start date is mentioned as 14/01/2004 and it is correct as it is the date on which notice to proceed was given to EPC contractor with first installment of disbursement.	**OK**	OK
ii. A description of how this start date has been determined, and a description of the evidence available to support this start date	EB 41	Ann 12	Yes, PP has considered the date of disbursement of first installment to EPC contractor as the project start date	**OK**	OK
iii. If this starting date is earlier than the date of publication of the CDM-PDD for global stakeholder consultation by a BVCH, description in Section B.5 contain a of how the benefits of the CDM were seriously considered prior to the starting date (EB41, Para 68).	EB 41	Ann 12	Yes, section B.5 contains how the benefits of the CDM were seriously considered prior to the starting date	**OK**	OK
x. In CDM-PDD section C.1.2 is the expected operational lifetime of the project activity in years and months provided?	EB 41	Ann 12	Yes, the expected operational lifetime of the project activity is 15 Years and 0 months.	**OK**	OK
y. In CDM-PDD section C.2 is it stated whether the project activity will use a renewable or a fixed crediting period and is C.2.1 or C.2.2 completed accordingly?	EB 41	Ann 12	Yes it is stated that fixed crediting period is chosen for the project activity.	**OK**	OK
z. In CDM-PDD section C.2.1 is it indicated that each crediting period shall be at most 7 years and	EB 41	Ann 12	Not applicable as PP has opted for fixed crediting period	**-**	OK

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may be renewed at most two times, provided that, for each renewal, a designated operational entity determines and informs the Executive Board that the original project baseline is still valid or has been updated taking account of new data where applicable?					
aa. In CDM-PDD section C.2.1.1 are dates in the following format: (DD/MM/YYYY) provided?	EB 41	Ann 12	Yes the dates are stated in the DD/MM/YYYY format.	**OK**	OK
bb. In CDM-PDD section C.2.1.2 is the length of the first crediting period in years and months provided?	EB 41	Ann 12	The length is stated to be 10 years and 0 Months.	**OK**	OK
cc. In CDM-PDD section C.2.2 is the fixed crediting period at most ten (10) years provided?	EB 41	Ann 12	Yes, the date format is as per the requirement	**OK**	OK
dd. In CDM-PDD section C.2.2.1are the dates provided in the following format: (DD/MM/YYYY)?	EB 41	Ann 12	Yes the dates are stated in the DD/MM/YYYY format.	**OK**	OK
ee. In CDM-PDD section C.2.2.2 is the length of the crediting period in years and months Provided?	EB 41	Ann 12	The length is stated to be 10 years and 0 Months.	**OK**	OK
ff. In CDM-PDD section D.2 are the conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the Host Party, if environmental impacts are considered significant by the project participants or the Host, provided	EB 41	Ann 12	Yes, the conclusions of EIA are mentioned in the section D.2	**OK**	OK
gg. In CDM-PDD section E.1 are the following provided?	EB 41	Ann 12			
i. The process by which comments by local stakeholders have been invited and compiled. An invitation for comments by local stakeholders	EB 41	Ann 12	The stakeholder meeting was arranged by sending invitation to stakeholders.	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
shall be made in an open and transparent manner, in a way that facilities comments to be received from local stakeholders and allows for a reasonable time for comments to be submitted.					
ii. The project activity is described in a manner, which allows the local stakeholders to understand the project activity, taking into account confidentiality provisions of the CDM modalities and procedures.	EB 41	Ann 12	Yes the meeting was conducted in a maer the stakeholders could understand the purpose of the same and this was confirmed by the validation team by interviewing some of the local stakeholder's duing the site visit.	**OK**	OK
iii. The local stakeholder process has been completed before submitting the proposed project activity to BVCH for validation.	EB 41	Ann 12	Yes the local stakeholder process has been completed prior to the submission of the project activity for validation	**OK**	OK
hh. In CDM-PDD section E.2 are following provided?	EB 41	Ann 12			
i. Identification of local stakeholders that have made comments	EB 41	Ann 12	The names of the stakeholders who commented in the stake holder meeting are not mentioned in the section E.2. Kindly provide the names accordingly	**CAR 10**	OK
ii. A summary of this comments.	EB 41	Ann 12	Yes, the comments received during stake holder meeting are provided in section E.2	**OK**	OK
ii. In CDM-PDD section E.3 is the explanation of how due account have been taken of comments received from local stakeholders provided?	EB 41	Ann 12	No negative comments were received during the local stake holders meeting.	**OK**	OK
jj. In CDM-PDD Annex 1 are the following provided?	EB 41	Ann 12			
i. Contact information of project participants	EB 41	Ann 12	The information is in line with the required format	**OK**	OK
ii. For each organisation listed in section A.3 the following mandatory fields: Organization, Name	EB 41	Ann 12	All the relevant sections are filled with correct information	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
of contact person, Street, City, Postfix/ZIP, Country, Telephone and Fax or e-mail					
kk. In CDM-PDD Annex 2 is information from Parties included in Annex I on sources of public funding for the project activity which shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties provided?	EB 41	Ann 12	It is stated that no ODA is involved in the project activity.	**OK**	OK
ll. In CDM-PDD Annex 3 is the background information used in the application of the baseline methodology provided?	EB 41	Ann 12	It is stated that the relevant information is stated in section B.6	**OK**	OK
mm. In CDM-PDD Annex 4 is the background information used in the application of the monitoring methodology provided?	EB 41	Ann 12	Referred in section B.7.2	**OK**	OK
4. Project description					
a. Does the PDD contain a clear description of the project activity that provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation?	VVM	58	Yes, the clear description of the project activity is provided.	**OK**	
b. Is the description of the proposed CDM project activity as contained in the PDD:	VVM	59	**Refer CAR 1 raised in above section**	**--**	OK
i. sufficiently covering all relevant elements?	VVM	59	**Refer CAR 1 raised in above section**	**--**	OK
ii. acurate?	VVM	59	**Refer CAR 1 raised in above section**	**---**	OK
iii. providing the reader with a clear understanding of the nature of the proposed CDM project activity?	VVM	59	**Refer CAR 1 raised in above section**	**--**	OK
iv. Are there any changes/modifications compared	VVM	59	Yes there were modification in response to the CAR/CL	**--**	OK

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to the webhosted PDD?			raised by the Validation team		
c. Is the proposed CDM project activity in existing facilities or utilizing existing equipments?	VVM	60	No, the proposed CDM project activity is not setup in existing facilities or utilizing existing equipments	**OK**	OK
d. Is the CDM project activity one of the following types:	VVM	60			
i. Large scale?	VVM	60	Yes, the proposed CDM Project activity is large scale, where estimated CER generation per annum is 445,231tCO_2e	**OK**	OK
ii. Non-bundled small scale projects with emission reductions exceeding 15,000 tonnes per year?	VVM	60	Not applicable	**-**	OK
iii. Bundled small scale projects, each with emission reductions not exceeding 15,000 tonnes?	VVM	60	Not applicable	**-**	OK
e. If yes to (c) and (d) above, was a physical site inspection conducted to confirm that the description in the PDD reflects the proposed CDM project activity, unless other means are specified in the methodology?	VVM	60	The physical site visit was conducted on 1/07/2008 - 02/07/2008 and 17/10/2011 by the validation team. The reason being, the team that visited during 2008 was not there at the time of final validation process, so the new validation team revisited the site along with the technical expert.	**OK**	OK
f. If yes to (d.iii) above, was the number of physical site visits base on sampling?	VVM	60	Not Applicable	**-**	OK
g. If yes is the sampling size appropriately justified through statistical analysis?	VVM	60	Not applicable	**-**	OK
h. For other individual proposed small scale CDM project activities with emission reductions not exceeding 15,000 tonnes per year, was a physical site inspection conducted?	VVM	61	Not applicable	**-**	OK
i. For all other proposed CDM project activities not referred to in paragraphs 59 – 61, was a physical	VVM	62	Yes the physical site inspection was conducted on 1st and 2nd July 2008 and later on 17/10/2011.	**OK**	OK

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site inspection conducted?					
j. If no, was it appropriately justified?	VVM	62	Not applicable	--	OK
k. Does the proposed CDM project activity involve the alteration of an existing installation or process?	VVM	63	It is a new installation	**OK**	OK
l. If yes, does the project description clearly state the differences resulting from the project activity compared to the pre-project situation?	VVM	63	Not applicable	**OK**	OK
5. Baseline and monitoring methodology					
a. General requirement					
a. Do the the baseline and monitoring methodologies selected by the project participants comply with the methodologies previously approved by the CDM Executive Board?	VVM	65	The baseline and monitoring methodology selected by project participants is AM0029 version 03	**OK**	OK
b. Is the selected methodology applicable to the project activity?	VVM	66	Refer to (5.b.a) below	-	OK
c. Had the PP correctly applied the selected methodology?	VVM	66	Refer to (5.b.c) below	-	OK
d. Had the selected methodology been correctly applied with respect to project boundary?	VVM	67	Refer to (5.c) below	-	OK
e. Had the selected methodology been correctly applied with respect to baseline identification?	VVM	67	Refer to (5.d) below	-	OK
f. Had the selected methodology been correctly applied with respect to Algorithms and/or formulae used to determine emission reductions?	VVM	67	Refer to (5.e) below	-	OK
g. Had the selected methodology been correctly applied with respect to additionality?	VVM	67			

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1. Does the PDD explain the additionality of the project activity on the basis of the folowing steps : - Benchmark investment analysis - Senstivity Analysis - Common practice analysis	AM0029		Approved methodology AM 0029 stipulates the additionality of the project activity to be presented considering Benchmark Analysis [Refer Step 1 of "Additionality" in the AM 0029 methodology]. However the benchmark analysis is not presented in the section B.5 of the webhosted PDD.	**CAR 15**	OK
h. Had the selected methodology been correctly applied with respect to monitoring methodology?	VVM	67	Yes in the PDD the title of the applied monitoring methodology AM 0029 is correctly applied.	**OK**	OK
1) Does the project activity involve the construction and operation of a natural gas fired power plant? 2) Is the power plant proposed to be set up under the project activtiy a new plant? 3) Is the natural gas based power plant connected to the grid? 4) Are the physical and geographical boundaries of the baseline grid; the power plant is connected to –clearly identifiable? 5) Is the information pertaining to the grid and the estimation of baseline emissions, publicly available?	AM0029		1. The project involves construction and operation of new Natural gas fired power plant 2. Yes, The proposed project activity is a new installation 3. Yes, the NG based power plant is connected to southern grid 4. Yes, the physical and geographical boundaries are clearly defined 5. Yes, the information pertaining to the grid and emission factors is publicly available 6. The applicability condition of the AM 0029 methodology pertaining to "sufficient availability of natural gas in the region that will not constrain the availability of gas for future projects" has been objectively demonstrated in	**CAR 13**	OK

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6) Can it be shown by the project participant that natural gas required for the project activity is sufficiently available and that future natural gas based power plants comparable in size to the project activity would not be constrained as a result of the use of natural gas by the project activity?			Appendix 1. Howevere, The justification provided in Appendix 1 of the PDD for availability of natural gas to satisfy the applicability condition of the AM 0029 v3 methodology does not transparently explain the following : • Supply position of natural gas in mmscd • Existing demand and expected future demand in mmscd for similar power plant projects • Supply-demand gap		
b. Applicability of the selected methodology to the project activity					
a. Is the selected baseline and monitoring methodology, previously approved by the CDM Executive Board, applicable to the project activity, including that the used version valid?	VVM	68	The approved baseline and monitoring methodology applicable is AM 0029 version 3 and is correctly quoted.	**OK**	OK
b. Has the DOE applied specific guidance provided by the CDM Executive Board in respect to the applicable approved methodology?	VVM	69	Yes BVCH applied specific guidance provided by the CDM Executive Board in respect to the applicable approved methodology	**OK**	OK
c. Is the methodology correctly quoted?	VVM	70	Ok, the methodology is an Approved baseline methodology AM0029 (version 03 EB 65) having title as “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas”.	**OK**	OK
d. Are the applicability conditions of the methodology met?	VVM	70	Project participant to explain the reason for not considering Lignite as one of the plausible alternative.	**CL 18**	OK
e. Is the project activity expected to result in	VVM	70	Not applicable, the project activity is expected to result in	**OK**	OK

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emissions other than those allowed by the methodology?			emissions for : 1) On-site fuel combustion due to the project activity 2) Transportation of fuel to project site (inside the project boundary) 3) Processing and transportation of fuel outside the project boundary – which is as per approved methodology AM 0029 (version 03 EB65		
f. Is the choice of the methodology justified?	VVM	70	OK, The project activity is Grid Connected Electricity Generation Plants using Natural Gas, hence the choice of the methodology is justified.	**OK**	OK
g. Have the project participants shown that the project activity meets each of the applicability conditions or the approved methodology?	VVM	70	Refer to (5.b.c) above	**-**	OK
h. Have the project participants shown that the project activity meets each of the applicability conditions of any tool or other methodology component referred to the methodology?	VVM	70	Refer CAR 13 above	**--**	OK
1) Does the methodology refer to Tool for demonstration and assessment of additionality and the Tool to calculate the emission factor for an electricity system?			Yes the methodology refers the both these tools and project participant has applied both.	**OK**	OK
i. Is BVCH, based on local and sectoral knowledge, aware that comparable information is available from sources other than that used in the PDD?	VVM	70	Yes BVCH, based on local and sectoral knowledge, is aware that comparable information is available from sources other than that used in the PDD and validation team used it to cross check in many instances.	**OK**	OK
j. If yes, was the PDD cross checked against the other sources to confirm that the project activity meets the applicability conditions of the methodology? (provide the reference to these choices)	VVM	70	The information in the PDD was cross-checked by the BVCH's validation team by means of its own sources. The specific sources that were referred to will be cited in the final report.	**OK**	OK

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k. Can a determination regarding the applicability of the selected methodology to the proposed CDM project activity be made?	VVM	71	Yes, The applicability of the selected methodology proposed to the CDM project is justifiable.	**OK**	OK
l. If no, clarification of the methodoloy was requested, in accordance with the guidance provided by the CDM Executive Board?	VVM	71	Please refer (5.j) above	**-**	OK
m. If answer to (5.b.d) above is "no", revision or deviation from the methodology was requested, in accordance with the guidance provided by the CDM Executive Board?	VVM	72	Please refer (5.j) above	**-**	OK
n. If yes to (5.b.l) and (5.b.m) above, a request for registration was submited before the CDM Executive Board has approved the proposed deviation or revision?	VVM	73	Not applicable	**OK**	OK
c. Project boundary					
a. Does the PDD correctly describe the project boundary, including the physical delineation of the proposed CDM project activity included within the project boundary for the purpose of calculating project and baseline emissions for the proposed CDM project activity?	VVM	77	Yes, the PDD describes the project boundary,	**OK**	OK
1) Does the spatial extent of the project boundary includes the project site and all power plants connected physically to the baseline grid as defined in "Tool to calculate emission factor for an electricity system".			Yes, the spatial extent of the project boundary includes the project site and all power plants connected physically to the baseline grid as defined in "Tool to calculate emission factor for an electricity system.	**OK**	OK
b. Is the delineation in the PDD of the project boundary correct and include identification of all locations, processes and equipment including	VVM	79	The project boundary is not demarcated in section B.3 of the PDD.	**CAR 3**	OK

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secondary equipment and associated processes such as logistics etc.?					
c. Does the delineation in the PDD of the project boundary meet the requirements of the selected baseline?	VVM		*Refer CAR 3 above*	**OK**	OK
d. Have changes been made to the project boundary in comparison to the webhosted PDD. If yes please comment on the reason for the changes.	VVM	79	No there are no changes to the project boundary in comparison to the webhosted PDD and this was confirmed from the site visit conducetd on 17/10/2011.	**OK**	OK
e. Have all sources and GHGs required by the methodology been included within the project boundary?	VVM	79	Yes, all sources and GHGs required by the methodology are included within the project boundary	**OK**	OK
f. Does the methodology allow project participant to choose whether a source or gas is to be included within the project boundary?	VVM	79	Not Applicable	**-**	OK
g. If yes, have the project participants justified that choice?	VVM	79	Not applicable	**-**	OK
h. If yes, is the justification provided reasonable? (provide reference to the supporting documented evidence provided by the project participants)	VVM	79	Not applicable	**-**	OK
d. Baseline identification					
a. Does the PDD identify the baseline for the proposed CDM project activity, defined as the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity?	VVM	81	Methodology prescribes baseline and same is mentioned in PDD	**OK**	OK
b. Has any procedure contained in the methodology to identify the most reasonable baseline scenario, been correctly applied?	VVM	82			

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1) Has the PDD derived the baseline scenario through an identification of various alternatives to the project activity? 2) Are all plausible alternatives to the project activity considered in the analysis? 3) Do the alternatives considered provide outputs or services comparable to the project activity? 4) Do the alternatives include at least the following : • The project activity not implemented as a CDM project; • Power generation using natural gas, but technologies other than the project activity; • Power generation technologies using energy sources other than natural gas; • Import of electricity from connected grids, including the possibility of new interconnections. 5) Do the alternatives consider all power plant technologies that have recently been constructed or are under construction or being planned? 6) Is a clear description of each baseline scenario alternative, including information on the technology such as efficiency and technical lifetime, provided in the PDD? 7) Are all the alternatives considered for the baseline			How the most plausible baseline scenario is identified is not explained. The options of power generation using fuels other than coal are not identified and discussed	**CAR 4**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
scenario in compliance with the legal and regulatory requirements?					
c. Does the selected methodology require use of tools (such as the "Tool for the demonstration and assessment of additionality" and the "Combined tool to identify the baseline scenario and demonstrate additionality") to establish the baseline scenario?	VVM	82	Approved methodology AM 0029 stipulates the additionality of the project activity to be presented considering Benchmark Analysis [Refer Step 1 of "Additionality" in the AM 0029 methodology]. However the benchmark analysis is not presented in the section B.5 of the webhosted PDD.	**CAR 15**	OK
d. If yes, was the methodology consulted on the application of these tools? (In such cases, the guidance in the methodology shall supersede the tool.)	VVM	82	Yes, the Approved baseline methodology AM0029 (version 03 EB39) is used for guidance.	**OK**	OK
• Is the additionality established using Steps 1 to 4 of the Tool for demonstration and assessment of additionality? • Is the baseline emission factor calculated using the Tool to calculate the emission factor for an electricity system?			Yes the both the tools are used by project participant	**OK**	OK
e. Does the methodology require several alternative scenarios to be considered in the identification of the most reasonable baseline scenario?	VVM	83	Yes, the Approved baseline methodology AM0029 (version 03 EB39) requires several alternative scenarios to be considered in the identification of the most reasonable baseline scenario	**OK**	OK
f. If yes, are all scenarios that are considered by the project participants and are supplementary to those required by the methodology reasonable in the context of the proposed CDM project activity?	VVM	83	The project participant needs to explain why 220 MW gas based plant is compared with 250 MW coal for the levelised cost analysis.	**Refer CL 13**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
g. Has any reasonable alternative scenario been excluded?	VVM	83	Please refer 5 d.f	-	OK
h. Is the baseline scenario identified reasonably supported by:	VVM	84	OK	**OK**	OK
i. Assumptions?	VVM	84	Yes the assumptions are considered from the publicly available data and validation team has cross checked the authenticity of the same and found to be appropriate	**OK**	OK
ii. Calculations?	VVM	84	The Calculations for calculating baseline are inline with Methodoloy AM 0029 ver. 3 and are found to be correctly used.	**OK**	OK
iii. Rationales?	VVM	84	The CEA database version 3 and IPCC data are referred as the baseline data and is justified.	**OK**	OK
i. Are the documents and sources referred to in the PDD correctly quoted and interpreted?	VVM	84	Refer CAR 13	--	OK
j. Was the information provided in the PDD cross checked with other verifiable and credible sources, such as local expert opinion, if available? (idendify the sources)	VVM	84	Not applicable	**OK**	OK
k. Have all applicable CDM requirements been taken into account in the identification of the baseline scenario for the proposed CDM project activity?	VVM	85	Please refer 5 d.f	-	OK
l. Have all relevant policies and circumstances been identified and correctly considered in the PDD, in accordance with the guidance by the CDM Executive Board?	VVM	85	National policies and circumstances relevant to the baseline of the proposed project activity have been included.	**OK**	OK
m. Does the PDD provide a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take	VVM	86	Please refer 5 d.f	-	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
place in the absence of the proposed CDM project activity?					
e. Algorithms and/or formulae used to determine emission reductions					
a. Do the steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions comply with the requirements of the selected baseline and monitoring?	VVM	89	Yes, all the steps taken and equations applied to calculate project emissions , baseline emissions, leakage and emission reduction comply with AM0029 ver 3	**OK**	OK
b. Have the equations and parameters in the PDD been correctly applied with respect those in the select approved methodology?	VVM	90	The steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions are used as per the approved baseline methodology AM0029 (version 03).	**OK**	OK
1) Does it Specify clearly which sources of project, baseline and leakage electricity consumption should be calculated with this tool; 2) Does it Provide necessary procedures, equations and monitoring provisions to determine the quantity of electricity that is consumed by each identified source;			1. Yes, sources of baseline, project and leakage of electricity consumption is calculated with Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 1 2. The procedures demonstrate which equations and monitoring provisions are used for each identified source	**OK**	OK
c. Does the methodology provide for selection between different options for equations or parameters?	VVM	90	Yes, the methodology provides for selection between different options for equations or parameters, accordingly the Project participant has selected three options as per methodology AM0029: version 03 Option 1: Build Margin Option 2: Combined Margin Option 3: Emission factor of Lignite based power plant	**OK**	OK

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d. If yes, has adequate justification been provided (based on the choice of the baseline scenario, context of the proposed CDM project activity and other evidence provided)?	VVM	90	Please refer 5.e.d above	-	OK
e. If yes, have correct equations and parameters been used, in accordance with the methodology selected?	VVM	90	Refer to (5.e.b) above	-	OK
f. Will data and parameters be monitored throughout the crediting period of the proposed CDM project activity?	VVM	91	OK, as per PDD, data and parameters will be monitored throughout the crediting period of the proposed CDM project activity i.e. 10 years.	**OK**	OK
g. If no, and these data and parameters will remain fixed throughout the crediting period, are all data sources and assumptions:	VVM	91	Please refer (5.e.f) above		OK
i. Appropriate and correct?	VVM	91	Please refer (5.e.f) above	-	OK
ii. Applicable to the proposed CDM project activity?	VVM	91	OK	**OK**	OK
iii. Resulting in a conservative estimate of the emission reductions?	VVM	91	Please refer (5.e.f) above	-	OK
h. Will data and parameters be monitored on implementation and hence become available only after validation of the project activity?	VVM	91	Please refer (5.e.f) above	-	OK
i. If yes, are the estimates provided in the PDD for these data and parameters reasonable?	VVM	91	OK	**OK**	OK
6. Additionality of a project activity					
a. Does the PDD describe how a proposed CDM projet activity is additional?	VVM	94	OK, PDD describes in Section B.5 about additionality of project.	**OK**	OK
b. Were the following steps of the tool to assess additionality used:	EB 39	Ann 10			
i. Identification of alternatives to the project	EB	Ann	Yes the PDD indicates the alternatives identified in line	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
activity?	39	10	with the methodology		
ii. Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible?	EB 39	Ann 10	OK. To determine whether the proposed project activity is economically or financially less attractive than the other alternatives without the CDM revenues, the sub-steps 2b, 2c and 2d have been followed as required under AM0029.	**OK**	OK
iii. Barriers analysis?	EB 39	Ann 10	Not applicable since PP has opted for Benchmark analysis	**OK**	OK
iv. Common practice analysis?	EB 39	Ann 10	i) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63.	**CL 14**	OK
c. In step 1 (i) have all the sub-steps as below been followed?	EB 39	Ann 10			
i. Sub-step 1a: Define alternatives to the project activity	EB 39	Ann 10	Please refer 5 d.f above	**--**	OK
ii. Sub-step 1b: Consistency with mandatory laws and regulations	EB 39	Ann 10	Yes it is clearly stated in the PDD about the mandatory laws and regulation	**OK**	OK
d. Have the following alternatives been included while defining alternatives as per sub-step 1a?	EB 39	Ann 10			
i. (a) The proposed project activity undertaken without being registered as a CDM project	EB 39	Ann 10	Not applicable		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
activity;					
ii. (b) Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs services or services with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;	EB 39	Ann 10	Please refer 5 d.f above	--	OK
iii. (c) If applicable, continuation of the current situation (no project activity or other alternatives undertaken).	EB 39	Ann 10	Not applicable	--	OK
e. Has the project participant included the technologies or practices that provide outputs or services with comparable quality, properties and application areas as the proposed CDM project activity and that have been implemented previously or are currently being introduced in the relevant country/region?	EB 39	Ann 10	Yes, the project participant included the technologies or practices that provide outputs or services with comparable quality, properties and application areas as the proposed CDM project activity and that have been implemented previously or are currently being introduced in the relevant country/region	**OK**	OK
f. Has the outcome of Step 1a: Identified realistic and credible alternative scenario(s) to the project activity done correctly? Please briefly mention the outcome.	EB 39	Ann 10	Please refer 5 d f	--	OK
g. Is the alternative(s) in compliance with all mandatory applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution.?	EB 39	Ann 10	OK	**OK**	OK
h. If an alternative does not comply with all mandatory applicable legislation and regulations,	EB 39	Ann 10	Not Applicable	--	OK

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has it been shown that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that noncompliance with those requirements is widespread in the country?					
i. Has the outcome of Step 1b: Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations done correctly? Please state the outcome.	EB 39	Ann 10	The Project participant has considered realistic and credible alternative scenario(s) to the project activity, which are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations, however, one of the scenario is not considered, refer (5.d.f) above	**OK**	OK
j. Has PP selected Step 2 (Investment analysis) or Step 3 (Barrier analysis) or both Steps 2 and 3?	EB 39	Ann 10	PP has opted for Step 2 Investment Analysis	**OK**	OK
k. In step 2, have all the sub-steps as below been followed?	EB 39	Ann 10			
i. Sub-step 2a: Determine appropriate analysis method;	EB 39	Ann 10	---		
ii. Sub-step 2b: Option I. Apply simple cost analysis;	EB 39	Ann 10	Not applicable, the project participant has done benchmark analysis	**OK**	OK
iii. Sub-step 2b: Option II. Apply investment comparison analysis;	EB 39	Ann 10	Not applicable, the project participant has done benchmark analysis	**OK**	OK
iv. Sub-step 2b: Option III. Apply benchmark analysis;	EB 39	Ann 10	The project participant has done benchmark analysis	**OK**	OK
v. Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II	EB 39	Ann 10	OK, Calculation and comparison of financial indicators done by project participant.	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
and III);					
vi. Sub-step 2d: Sensitivity analysis (only applicable to Options II and III).	EB 39	Ann 10	OK, Sensitivity analysis done by project participant.	**OK**	OK
l. In sub-step 2a has the determination of appropraite method of analysis done as per the guidance as below?	EB 39	Ann 10			
i. Simple cost analysis if the CDM project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than CDM related income (Option I).	EB 39	Ann 10	Not applicable. PP has opted for investment comparison analysis and benchmark analysis.	**OK**	OK
ii. Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III). Specify option used with justification.	EB 39	Ann 10	Please refer 6.m.i above	**-**	OK
m. Has the below guideline followed for sub-step 2b Option I. Apply simple cost analysis? Document the costs associated with the CDM project activity and the alternatives identified in Step1 and demonstrate that there is at least one alternative which is less costly than the project activity.	EB 39	Ann 10	Not applicable	**OK**	OK
n. Has the below guideline followed for sub-step 2b Option II. Apply investment comparison analysis? Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service most suitable for the project type and decision-making context. Please specify	EB 39	Ann 10	Not applicable, the PP has applied sub-step 2b Option III (Apply Benchmark Analysis)	**OK**	OK
o. Has the below guideline followed for Sub-step 2b: Option III. Apply benchmark analysis?	EB 39	Ann 10	Yes	**OK**	OK
i. Identify the financial/economic indicator, such as	EB	Ann	Based on Option III of sub-step (2b), the indicator that has	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
IRR, most suitable for the project type and decision context.	39	10	been selected by project participant for benchmark analysis is the levelized tariff for power generation in INR/kWh.		
ii. When applying Option II or Option III, the financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer. Only in the particular case where the project activity can be implemented by the project participant, the specific financial/economic situation of the company undertaking the project activity can be considered.	EB 39	Ann 10	The project participant has used standard available data from CEA database.	**OK**	OK
iii. Discount rates and benchmarks shall be derived from: (a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data; (b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects; (c) A company internal benchmark (weighted average capital	EB 39	Ann 10	The PP has referred to the Levelised cost of electricity generation. However, The levelised cost for coal & naptha is not supported by detailed financial spreadsheets.	**CAR 14**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
cost of the company), only in the particular case referred to above in 2. The project developers shall demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark; (d) Government/official approved benchmark where such benchmarks are used for investment decisions; (e) Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified. Please specify benchmark and justify.					
p. Has the below guideline followed for Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III)?	EB 39	Ann 10	Yes, the project participant has mentioned that Sub-step 2c: Calculation and comparison of financial indicators has been followed but was unable to locate it in PDD	**OK**	OK
i. Calculate the suitable financial indicator for the proposed CDM project activity and, in the case of Option II above, for the other alternatives. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but possibly including inter alia subsidies/fiscal incentives, ODA, etc, where applicable), and, as appropriate, non-market cost and benefits in the case of public investors if this is standard practice for the selection of public investments in the host country.	EB 39	Ann 10	The levelized tariff for all the plausible options to the proposed project activity have been calculated and presented in Section B.4 of the PDD	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
ii. Present the investment analysis in a transparent manner and provide all the relevant assumptions, preferably in the CDM-PDD, or in separate annexes to the CDM-PDD.	EB 39	Ann 10	OK, the investment analysis in a transparent manner is provided in PDD in section B.4	**OK**	OK
iii. Justify and/or cite assumptions.	EB 39	Ann 10	The basis for various costs considered as input parameters (such as O&M charges, etc.), is taken in the levelised cost analysis to be as per the EPC contract. According to the EB's investment guidance (EB 62 Annex 5), however, the input values should be as applicable as per the data available at the time of decision	**CAR 17**	OK
iv. In calculating the financial/economic indicator, the project's risks can be included through the cash flow pattern, subject to project-specific expectations and assumptions.	EB 39	Ann 10			
v. Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.	EB 39	Ann 10	Please refer 6.q.v	**-**	
vi. Present in the CDM-PDD a clear comparison of the financial indicator for the proposed CDM activity.Please specify details for above.	EB 39	Ann 10	Clear Comparison of the financial indicator is presented in section B.4 of the PDD.	**OK**	OK
q. Has the below guideline followed for Sub-step 2d: Sensitivity analysis (only applicable to Options II and III)? Include a sensitivity analysis that shows whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions.	EB 39	Ann 10	Yes, the sensitivity analysis is done. This shows that financial/economic attractiveness is robust to reasonable variations in the critical assumptions. However, The sensitivity analysis is carried out for ± 5% only, which is not as per the guidelines on Investment Analysis as stipulated in EB 62 Annex 5. Also, the sensitivity analysis has been carried out only for the benchmark analysis involving the project IRR. The levelised cost computation	**CAR 12**	OK

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			carried out for demonstration of the baseline alternative has not been subjected to a sensitivity analysis		
r. Has the outcome of Step 2 clearly mentioned with justification?	EB 39	Ann 10	OK, the outcome has been clearly mentioned.	**OK**	OK
s. In step 3: Barrier analysis have all the sub-steps as below been followed?	EB 39	Ann 10	Not Applicable	**OK**	OK
i. Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity;	EB 39	Ann 10	Please refer 6.t.	**-**	
ii. Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity).	EB 39	Ann 10	Please refer 6.t.	**-**	
t. Has the below guideline followed for Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project?	EB 39	Ann 10	Please refer 6.t. above	**-**	
i. (a) Investment barriers: For alternatives undertaken and operated by private entities: Similar activities have only been implemented with grants or other non-commercial finance terms. No private capital is available from domestic or international capital markets due to real or perceived risks associated with investment in the country where the proposed CDM project activity is to be implemented, as demonstrated by the credit rating of the country or other country investments reports of reputed origin.	EB 39	Ann 10	No barriers are compared.	**OK**	OK

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ii. (b) Technological barriers: Skilled and/or properly trained labour to operate and maintain the technology is not available in the relevant country/region, which leads to an unacceptably high risk of equipment disrepair and malfunctioning or other underperformance; Lack of infrastructure for implementation and logistics for maintenance of the technology, Risk of technological failure: the process/technology failure risk in the local circumstances is significantly greater than for other technologies that provide services or outputs comparable to those of the proposed CDM project activity, as demonstrated by relevant scientific literature or technology manufacturer information, The particular technology used in the proposed project activity is not available in the relevant region.	EB 39	Ann 10	Not Applicable	--	OK
iii. (c) Barriers due to prevailing practice: The project activity is the "first of its kind".	EB 39	Ann 10	Not Applicable	**OK**	OK
iv. (d) Other barriers, preferably specified in the underlying methodology as examples.	EB 39	Ann 10	Not Applicable	**OK**	OK
u. Has the outcome from Step 3a clearly mentioned in PDD?	EB 39	Ann 10	OK	**OK**	OK
v. Has the below guideline followed for Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity)?	EB 39	Ann 10			OK
i. If the identified barriers also affect other	EB	Ann	Not Applicable	**OK**	OK

	CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
	alternatives, explain how they are affected less strongly than they affect the proposed CDM project activity. In other words, demonstrate that the identified barriers do not prevent the implementation of at least one of the alternatives. Any alternative that would be prevented by the barriers identified in Sub-step 3a is not a viable alternative, and shall be eliminated from consideration.	39	10			
ii.	Provide transparent and documented evidence, and offer conservative interpretations of this documented evidence, as to how it demonstrates the existence and significance of the identified barriers and whether alternatives are prevented by these barriers.	EB 39	Ann 10	Not Applicable	**OK**	OK
iii.	The type of evidence to be provided should include at least one of the following: (a) Relevant legislation, regulatory information or industry norms; (b) Relevant (sectoral) studies or surveys (e.g. market surveys, technology studies, etc) undertaken by universities, research institutions, industry associations, companies, bilateral/multilateral institutions, etc; (c) Relevant statistical data from national or international statistics; (d) Documentation of relevant market data (e.g. market prices, tariffs, rules); (e) Written documentation of independent expert judgments from industry, educational institutions (e.g. universities, technical schools,	EB 39	Ann 10	Not applicable		

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training centres), industry associations and others. Please specify.					
w. Has the outcome from Step 3 clearly mentioned in PDD?	EB 39	Ann 10	OK	**OK**	OK
x. In step 4: Common practise analysis have all the sub-steps as below followed?	EB 39	Ann 10	i) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63.	**CL 14**	OK
i. Sub-step 4a: Analyze other activities similar to the proposed project activity;	EB 39	Ann 10	Refer	**OK**	OK
ii. Sub-step 4b: Discuss any similar Options that are occurring.	EB 39	Ann 10	As mentioned in PDD, there are no Other Activities that are similar to the Project Activity and hence the Sub-Step 4(b) is not applicable to the Project Activity.	**OK**	OK
y. Has the below guideline followed for Sub-step 4a: Analyze other activities similar to the proposed project activity? Provide an analysis of any other activities that are operational and that are similar to the proposed project activity. Other CDM project activities are not to be included in this analysis. Provide documented evidence and, where relevant, quantitative information. On the	EB 39	Ann 10	OK, Following evidence is provided in support of the analysis. http://www.ercap.org/OtherOrders/	**OK**	OK

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basis of that analysis, describe whether and to which extent similar activities have already diffused in the relevant region.					
z. Has the below guideline followed for Sub-step 4b: Discuss any similar Options that are occurring? If similar activities are identified, then it is necessary to demonstrate why the existence of these activities does not contradict the claim that the proposed project activity is financially/economically unattractive or subject to barriers. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially/economically attractive (e.g., subsidies or other financial flows) and which the proposed project activity cannot use or did not face the barriers to which the proposed project activity is subject. In case similar projects are not accessible, the PDD should include justification about non-accessibility of data/information.	EB 39	Ann 10	Please refer 6.y.ii. above	**OK**	OK
aa. Has the outcome from Step 4 clearly mentioned in PDD?	EB 39	Ann 10	Yes the outcome of Step 4 is clearly mentioned in the PDD	**OK**	OK
bb. Has it been proved that the project is additional?	EB 39	Ann 10	Yes, it is ben proved that project activity is additional	**OK**	OK
a. Prior consideration of the clean development mechanism					

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
a. Is the project ativity start date prior to the date of publication of the PDD for stakeholder comments?	VVM	98	Yes, the project start date is prior to the publication of the PDD for global stakeholder comments Start date of the project activity is 14 January 2004 Date of Publication of the PDD Global Stake Holder Comment is 31 May 2008	**OK**	OK
b. If yes, were the CDM benefits considered necessary in the decision to undertake the project as a proposed CDM project activity?	VVM	98	Yes, the CDM benefits were considered while taking decision to undertake the project as a proposed CDM project activity. The extract of the resolution of the Board of Directors of GVK dated 28-Feb-2003 states the capacity of the project 220 MW. Commissioning certificate approved by APPCC also indicates the capacity to be 220 MW. However the project capacity in the EPC contract documents of Alstom Ltd is 228 MW.	**CL 6**	OK
c. Is the start date of the project activity, reported in the PDD, in accordance with the "Glossary of CDM terms", which states that "The starting date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins."?	VVM	99	Yes, Starting date of the project activity is: 14/01/2004 The start date of a CDM project activity is "the earliest date at which either the implementation or construction or real action of a project activity begins". In light of the above definition, GVK has taken the start date as the date of EPC contract.	**OK**	OK
d. Does the project activity require construction, retrofit or other modifications?	VVM	99	The project activity requires construction	**OK**	OK
e. If yes, is it ensured that the date of commissioning cannot be considered as the project activity start date?	VVM	99	Yes, date of commissioning 14 April 2009 is not considered as the project activity start date (14/01/2004)	**OK**	OK
f. Is it a new project activity (a project activity with a start date on or after 02 August 2008) or an	VVM	100	It is an existing project activity – start date is	**OK**	OK

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existing project activity (a project activity with a start date before 02 August 2008)?			14/01/2004, which is prior to 02 August 2008.		
g. For a new project, for which PDD has not been published for global stakeholder consultation or a new methodology proposed to the CDM Executive Board before the project activity start date, had PPs informed the host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status? (Provide reference to such confirmation from host Party DNA and UNFCCC secretariat).	VVM	101	Not applicable, Refer a.f.(Prior consideration) above.	**OK**	OK
h. For an existing project activity, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, are the following evidences provided:	VVM	102			
ii. evidence that must indicate that awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project, including, inter alia:	VVM	102	The Project participant has provided evidence that Board resolution dated 28-Feb-03 is prior to project activity start date 14/01/2004 and it mentions about the consideration of CDM benefits that would help to mitigate techno – environmental risk associated with gas power project. The board resolution compares to two proposals one based on Coal being the fuel and other on Natural gas as the fuel. Project participant may please clarify as to how there could be a proposal for setting up the coal based power plant when previous action indicate the capacity expansion is based on Natural gas &/or Naphtha.	**CL 17**	OK
a. minutes and/or notes related to the			Please refer a.h.ii above	**-**	

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consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a proposed CDM project activity?					
iii. reliable evidence from project participants that must indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation, including, inter alia:	VVM	102			
a. contract with consultants for CDM/PDD/methodology services?	VVM	102	Contract with consultant for CDM/PD is available and found to be appropriate.	**OK**	OK
b. Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds)?	VVM	102	ERPA is available	**OK**	OK
c. evidence of agreements or negotiations with a DOE for validation services?	VVM	102	**Communication with various DOE's was available during the validation process**	**OK**	OK
d. submission of a new methodology to the CDM Executive Board?	VVM	102	Not applicable	**--**	OK
e. publication in newspaper?	VVM	102	**Not applicable**	**--**	OK
f. interviews with DNA?	VVM	102	OK		
g. earlier correspondence on the project with the DNA or the UNFCCC secretariat?	VVM	102	**The communication for HCA with Indian DNA was provided by the project participant.**	**OK**	OK
h. Has the chronology of events including time lines been appropriately captured and explained/detailed in the PDD?	VVM	102	**Yes the chronology of events including timeline are revised in line with the CAR/CL raised by the validation team in course of validation and now are correctly presented.**	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
b. Identification of alternatives					
a. Does the approved methodology that is selected by the proposed CDM project activity prescribe the baseline scenario and hence no further analysis is required?	VVM	105	The approved methodology is AM0029, which describes the baseline scenario; hence no further analysis is required.	**OK**	OK
b. If no, does the PDD identify credible alternatives to the project activity in order to determine the most realistic baseline scenario?	VVM	105	The project participant needs to explain why 220 MW gas based plant is compared with 250 MW coal for the levelised cost analysis.	**Refer CL 13**	OK
c. Does the list of alternatives given in the PDD ensure that:	VVM	106			
i. the list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity?	VVM	106	OK, alternative 1 in the PDD is: Power generation using natural gas as fuel and combined cycle technology without CDM revenues (Project activity) in the section B.4.	**OK**	OK
ii. the list contains all plausible alternatives that BVCH, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity?	VVM	106			
iii. the alternatives comply with all applicable and enforced legislation?	VVM	106	Yes alternatives comply with all applicable and enforced legislation	**OK**	OK
c. Investment analysis					
a. Has investment analysis been used to demonstrate the additionality of the proposed CDM project activity?	VVM	108	Yes, to demonstrate the additionality of the proposed CDM project activity, investment analysis is carried out.	**OK**	OK
b. If yes, does the PDD provide evidence that the proposed CDM project activity would not be:	VVM	108			

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
i. the most economically or financially attractive alternative?	VVM	108	OK, the methodology AM0029 requires a benchmark investment analysis to be carried out to justify that the project is additional. The benchmark selected is, levelized cost of electricity generation according to the Tool for demonstration and assessment of additionality. Further deviation observed was reported as CAR?CL above	--	OK
ii. economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs)?	VVM	108	It is indicated that the project is not economically feasible without the revenue of the CER	**OK**	OK
c. Was this shown by one of the following approaches?	VVM	109			
i. The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income. Document the costs associated with the proposed CDM project activity and the alternatives identified and demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity.	VVM	109	Not applicable as, the proposed CDM project activity would earn financial benefits from sale of electricity generated from the project activity other than revenue earned from CDM,	**OK**	OK
ii. The proposed CDM project activity is less economically or financially attractive than at least one other credible and realistic alternative.	VVM	109	Yes, the proposed CDM Project activity is less economically attractive	**OK**	OK
iii. The financial returns of the proposed CDM project activity would be insufficient to justify the required investment.	VVM	109	Not applicable	--	OK
d. Is the period of assessment limited to the proposed crediting period of the CDM project activity?	EB 51	Ann 58	NO, the period of assessment is not limited to the proposed crediting period of the CDM project activity. Instead it is upto 15 years.	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
e. Does the project IRR and equity IRR calculations reflect the period of expected operation of the underlying project activity (technical lifetime), or - if a shorter period is chosen - include the fair value of the project activity assets at the end of the assessment period?	EB 51	Ann 58	Please refer c.d (Investment Analysis) above	**OK**	OK
f. Does the IRR calculation include the cost of major maintenance and/or rehabilitation if these are expected to be incurred during the period of assessment?	EB 51	Ann 58	The project participant has carried out the Levelised Cost analysis. This involves O & M cost also	**OK**	OK
g. Do the project participants justify the appropriateness of the period of assessment in the context of the underlying project activity, without reference to the proposed CDM crediting period?	EB 51	Ann 58	Ok, the period of assessment is 15 years, project activity expected life time is also 15 years, and crediting period considered by PP is 10 years.	**OK**	OK
h. Does the cash flow in the final year include a fair value of the project activity assets at the end of the assessment period?	EB 51	Ann 58	As the PP has used levelised cost of generation, hence levelised tariff for power generation for 15 years of assessment is considered.	**OK**	OK
i. Has the fair value been calculated in accordance with local accounting regulations where available, or international best practice?	EB 51	Ann 58	Yes, the values from CEA data base, CERC are considered	**OK**	OK
j. Does the fair value calculations include both the book value of the asset and the reasonable expectation of the potential profit or loss on the realization of the assets?	EB 51	Ann 58	Yes the the fair value calculations include both the book value of the asset and the reasonable expectation of the potential profit or loss on the realization of the assets	**OK**	OK
k. Was depreciation, and other non-cash items related to the project activity, which have been deducted in estimating gross profits on which tax is calculated, added back to net profits for the	EB 51	Ann 58	Yes, depreciation, and other non-cash items related to the project activity, which have been deducted in estimating gross profits on which tax is calculated, added back to net profits for the purpose of calculating the IRR- the financial	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
purpose of calculating the financial indicator (e.g. IRR, NPV)?			indicator		
l. Has taxation been included as an expense in the IRR/NPV calculation in cases where the benchmark or other comparator is intended for post-tax comparisons?	EB 51	Ann 58	the PP has considered levelised cost of electricity generation as well the benchamark analysis and hence the taxation has been included as an expense in computation of IRR	**OK**	OK
m. Are the input values used in all investment analysis valid and applicable at the time of the investment decision taken by the project participant?	EB 51	Ann 58	The project participant has considered and used Levelised cost of electricity generation for financial calculations and Taxes are included as expenses,	**OK**	OK
n. Is the timing of the investment decision consistent and appropriate with the input values?	EB 51	Ann 58	Yes the timing of investment decision consistent and appropriate with the input values		
o. Are all the listed input values been consistently applied in all calculations?	EB 51	Ann 58	The webhosted PDD does not quote the supporting reference for the techno economic parameters of the project activity	**(CL 12)**	OK
p. Does the investment analysis reflect the economic decision making context at point of the decision to recomence the project in the case of project activities for which implementation ceases after the commencement and where implementation is recommenced due to consideration of the CDM?	EB 51	Ann 58	The project is new installation and there was no incidence of ceasing the operations after commencement.	**OK**	OK
q. Have project participants supplied the spreadsheet versions of all investment analysis?	EB 51	Ann 58	Yes, the project participants supplied the spreadsheet versions of all investment analysis	**OK**	OK
r. Are all formulas used in this analysis readable and all relevant cells be viewable and unprotected?	EB 51	Ann 58	Yes, all the forumalas are readable and all cells are viewable and unprotected.	**OK**	OK
s. In cases where the project participant does not wish to make such a spreadsheet available to the public has the PP provided an exact read-only or PDF copy for general publication?	EB 51	Ann 58	Not applicable	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
t. In case the PP wishes to black-out certain elements of the publicly available version, is it justifiable?	EB 51	Ann 58	Not Applicable	**OK**	OK
u. Was the cost of financing expenditures (i.e. loan repayments and interest) included in the calculation of project IRR?	EB 51	Ann 58	Please refer c.m (Investment Analysis) above	**-**	
v. In the calculation of equity IRR, has only the portion of investment costs which is financed by equity been considered as the net cash outflow?	EB 51	Ann 58	Not applicable	**OK**	OK
w. Has the portion of the investment costs which is financed by debt been considered a cash outflow in the calcualtion of equity IRR? (this is not allowed)	EB 51	Ann 58	Please refer c.m (Investment Analysis) above	**-**	
x. Was a pre-tax benchmark be applied?	EB 51	Ann 58	Yes the IDBI Prime Lending Rate is considered as benchmark which is pre tax benchmark	**OK**	OK
y. In cases where a post-tax benchmark is applied, is actual interest payable taken into account in the calculation of income tax?	EB 51	Ann 58	Not Applicable	**--**	OK
z. In such situations, was interest calculated according to the prevailing commercial interest rates in the region, preferably by assessing the cost of other debt recently acquired by the project developer and by applying a debt-equity ratio used by the project developer for investments taken in the previous three years?	EB 51	Ann 58	Not Applicable	**--**	OK
aa. In cases where a benchmark approach is used is the applied benchmark appropriate to the type of IRR calculated?	EB 51	Ann 58	Yes the IDBI Prime Lending Rate is considered as benchmark and is appropriate inline with the Guidance for Investment Analysis, Ver5 EB 62	**OK**	OK
bb. Has local commercial lending rates or weighted	EB	Ann	Not applicable,	**--**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
average costs of capital (WACC) selected as appropriate benchmarks for a project IRR?	51	58			
cc. Has required/expected returns on equity selected as appropriate benchmark for an equity IRR?	EB 51	Ann 58	Not applicable	--	OK
dd. In case benchmarks supplied by relevant national authorities selected is it applicable to the project activity and the type of IRR calculation presented?	EB 51	Ann 58	Not Applicable	--	OK
ee. In the cases of projects which could be developed by an entity other than the project participant is the benchmark applied based on publicly available data sources which can be clearly validated?	EB 51	Ann 58	Not Applicable	--	OK
ff. Have internal company benchmarks/expected returns (including those used as the expected return on equity in the calculation of a weighted average cost of capital - WACC) been applied in cases where there is only one possible project developer?	EB 51	Ann 58	Not applicable	--	OK
gg. In such cases, have these values been used for similar projects with similar risks, developed by the same company or, if the company is brand new, would have been used for similar projects in the same sector in the country/region?	EB 51	Ann 58	Not Applicable	--	OK
hh. Has a minimum clear evidence of the resolution by the company's Board and/or shareholders been provided to the effect as above?	EB 51	Ann 58			
ii. Has a thorough assessment of the financial statements of the project developer - including the proposed WACC - to assess the past financial	EB 51	Ann 58	Since the financial indicator selected is the levelised cost per kWh of power generated, and the same indicator is used to justify the baseline as well as claim the	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
behavior of the entity during at least the last 3 years in relation to similar projects been conduted?			additionality of the project activity, the past financial behaviour is not of relevant consideration		
jj. Does the risk premiums applied in the determination of required returns on equity reflect the risk profile of the project activity being assessed, established according to national/international accounting principles? (It is not considered reasonable to apply the rate general stock market returns as a risk premium for project activities that face a different risk profile than an investment in such indices.)	EB 51	Ann 58	Not Applicable	--	OK
kk. Has an investment comparison analysis and not a benchmark analysis used when the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services?	EB 51	Ann 58	No, investment comparison analysis is not done, instead benchmark analysis is done.	**OK**	OK
ll. Have variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues been subjected to reasonable variation (positive and negative) and the results of this variation been presented in the PDD and be reproducible in the associated spreadsheets?	EB 51	Ann 58	There is a significant difference between assumed value of the input parameter and the actual values for loan interest rate and auxiliary consumption. The variation is more than 10%. Project participant to justify why these parameters should not be subjected to higher sensitivity range	**CL 10**	OK
mm. Have a corrective action been raised for a variable to be included in the sensitivity analysis which constitute less than 20% and have a material impact on the analysis ?	EB 51	Ann 58	Only two parameters- PLF and fuel cost are considered for the sensitivity analysis. Project participant is requested to explain why other parameters such as project cost, station heat rate, O&M cost, are not considered.	**CL 8**	
nn. Is the range of variations selected is reasonable in	EB	Ann	There is a significant difference between assumed value of	**(CL**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
the project context?	51	58	the input parameter and the actual values for loan interest rate and auxiliary consumption. The variation is more than 10%. Project participant to justify why these parameters should not be subjected to higher sensitivity range	**10)**	
oo. Does the variations in the sensitivity analysis at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances?	EB 51	Ann 58	The actual O&M cost is observed from the O&M agreement to be only 3.3 % of the total project cost, on an average. PP to explain why the sensitivity should not be extended to -17% for this input parameter.	**CL 9**	OK
pp. In cases where a scenario will result in the project activity passing the benchmark or becoming the most financially attractive alternative, is an assessment done of the probability of the occurrence of this scenario in comparison to the likelihood of the assumptions in the presented investment analysis, taking into consideration correlations between the variables as well as the specific socio-economic and policy context of the project activity?	EB 51	Ann 58	Not applicable	**OK**	OK
qq. Was the plant load factor defined ex-ante in the CDM-PDD according to one of the following options:	EB 48	Ann 11	Project participant project participant is requested to justify the consideration of 85% PLF for the project activity.	**(CL7)**	OK
i. The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval?	EB 48	Ann 11	Please refer qq.i above	**-**	
ii. The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)?	EB 48	Ann 11	Please refer qq.i above	**-**	

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
rr. Was a thorough assessment of all parameters and assumptions used in calculating the relevant financial indicator, and determine the accuracy and suitability of these parameters using the available evidence and expertise in relevant accounting practices conducted?	VVM	111			
ss. Were the parameters cross-checked agains third-party or publicly available sources, such as invoices or price indices?	VVM	111	Yes the the parameters cross-checked agains third-party or publicly available sources, such as invoices or price indices	**OK**	OK
tt. Were feasibility reports, public announcements and annual financial reports related to the proposed CDM project activity and the project participants reviewed?	VVM	111	Yes the public announcements were reviewed	**OK**	OK
uu. Was the correctnes of computations carried out and documented by the project participants assessed?	VVM	111	the correctnes of computations carried out and documented by the project participants assessed	**OK**	OK
vv. Was the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur, and the likelihood of these conditions assessed?	VVM	111	Refer CAR 12, CL 8 and 9 raised above	**--**	OK
ww. Is the type of benchmark applied is suitable for the type of financial indicator presented?	VVM	112	Yes the IDBI Prime Lending Rate is appropriate benchmark for project IRR computed	**OK**	OK
xx. Do any risk premiums applied determining the benchmark reflect the risks associated with the project type or activity?	VVM	112	Not applicable	**--**	OK
yy. To determine this, was it assessed whether it is reasonable to assume that no investment would be made at a rate of return lower than the					

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
benchmark by:					
i. assessing previous investment decisions by the project participants involved?	VVM	112	Not applicable	--	OK
ii. determining whether the same benchmark has been applied?	VVM	112	Not applicable	--	OK
iii. determining if there are verifiable circumstances that have led to a change in the benchmark?	VVM	112	Not applicable	--	OK
zz. Did the project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed CDM project activities?	VVM	113	There was no reference of FSR indicated in the PDD	**OK**	OK
xx. If yes:	VVM	113	Please refer zz.i above	-	
i. has the FSR been the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short for the BVCH to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed?	VVM	113	Not applicable	--	
ii. Are the values used in the PDD and associated annexes fully consistent with the FSR?	VVM	113	Not applicable	--	
iii. If not, was the appropriateness of the values validated?	VVM	113	Not applicable	--	
iv. On the basis of its specific local and sectoral expertise, is confirmation provided, by cross-checking or other appropriate manner, that	VVM	113	Not applicable	--	

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
the input values from the FSR are valid and applicable at the time of the investment decision?					
d. Barrier analysis					
a. Has barrier analysis been used to demonstrated the additionality of the proposed CDM project activity?	VVM	115	No, the project participant has not opted for barrier analysis.	**OK**	OK
b. If yes, does the PDD demonstrate that the proposed CDM project activity faces barriers that:	VVM	115	Refer (d.-a.barrier analysis) above	-	OK
i. prevent the implementation of this type of proposed CMD project activity?	VVM	115	Refer (d.-a.barrier analysis) above	-	OK
ii. do not prevent the implementation of at least one of the alternatives?	VVM	115	Refer (d.-a.barrier analysis) above	-	OK
c. Are there any issues that have a clear direct impact on the financial returns of the project activity, other than: risk related barriers, for example risk of technical failure, that could have negative effects on the financial performance; or barriers related to the unavailability of sources of finance for the project activity? {If yes, these issues cannot be considered barriers and shall be assessed by investment analysis. [Refer to (6.c) above]}	VVM	116	Refer (d-a.barrier analysis) above	-	OK
d. Were the barriers determined as real by:	VVM	117			
i. assssing the available evidence and/or undertaking interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether	VVM	117	Refer (d.-a.barrier analysis) above	-	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
the barriers listed in the PDD exist?					
ii. ensuring that existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics?	VVM	117	Refer (d.-a.barrier analysis) above	-	OK
iii. Is existence of a barrier substantiated only by the opinions of the project participants? (If yes, this barrier cannot be considered as adequately substantiated)	VVM	117	Refer (d.-a.barrier analysis) above	-	OK
e. Were the barriers determined as preventing the implementation of the project activity but not the implementation of at least one of the possible alternatives by applying local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of *at least one of* the possible alternatives, in particular the identified baseline scenario?	VVM	117	Refer (d-a.barrier analysis) above	-	OK
e. Common practice analysis					
a. Is this a proposed large-scale, or first-of-its kind small-scale project activity?	VVM	119	The proposed Project is large scale project activity	**OK**	OK
b. If yes, was common practice analysis carried out as a credibility check of the other available evidence used by the project participants to demonstrate additionality?	VVM	119	Yes, common practice analysis carried out as a credibility check of the other available evidence used by the project participants to demonstrate additionality	**OK**	OK
c. Was it assessed whether the geograpphical scope (e.g. defined region) of the common practice	VVM	120	i) The description for common practice does not transparently explain why the project activity cannot be	**(CL 14)**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
analysis is appropriate for the assessment of common practice related to the project activity's technology or industry type? (For certain technologis the relevatn region for assessment will be local and for others it may be transnational/global.			regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63..		
d. Was a region other than the entire host country chosen?	VVM	120	i) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63..	**(CL 14)**	OK
e. If yes, was the explanation why this region is more appropriate assessed?	VVM	120	i) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating	**(CL 14)**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63.		
f. Using official sources and local and industry expertise, was it determined to what extent similar and operational projects (e.g., using similar technology or practice), other than CDM project activities, have been undertaken in the defined region?	VVM	120	i) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63..	**(CL 14)**	OK
g. Are similar and operational projects, other than CDM project activities, already "widely observed and commonly carried out" in the defined region?	VVM	120	i) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63..	**(CL 14)**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
h. If yes, was it assessed whether there are essential distinctions between the proposed CDM project activity and the other similar activities?	VVM	120	i) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63..	**(CL 14)**	OK
7. Monotoring plan					
a. Does the PDD include a monitoring plan?	VVM	122	Yes, PDD includes a monitoring plan	**OK**	OK
b. Is this monitoring plan based on the approved monitoring methodology applied to the proposed CDM project activity?	VVM	122	Yes, Monitoring plan is based on approved monitoring methodology AM0029, ver 3	**OK**	OK
c. Were the list of parameters required by the the selected methodology identified?	VVM	123	Yes, the parameters required by AM0029, ver 3 are identified. However, Project participant to explain how the project electricity imports from the grid are taken into account in the emission reduction computations	**CL 11**	OK
d. Does the monitoring plan contains all necessary parameters?	VVM	123	Yes. Please refer 5.e.f above	**-**	OK
e. Are the parameters clearly described?	VVM	123	Please refer 5.e.f. above	**-**	OK
f. Does the means of monitoring described in the plan comply with the requirements of the methodology?	VVM	123	Yes, the monitoring described in the plan comply with the requirements of the methodology	**OK**	OK
1) Is the AM 0029 monitoring methodology used in conjunction			1) Both baseline and monitoring methodologies are used in conjunction with each other as per AM0029,ver 3	**OK**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
with the baseline methodology ? 2) Do the following parameters get monitored in the proposed project activity ? 1. Annual fuel(s) consumption in project activity; 2. Net Calorific Value(s) of the fuel used in the project activity; 3. Fuel emission factors for fuel used in the project activity. 3) Are the baseline emissions monitored in accordance with the Tool to calculate the emission factor for an electricity system ?			2) All the listed parameters are included in the monitoring plan described in the PDD 3) Baseline emission factor is calculated as per the tool to calculate the emission factor for an electricity system. Consequently, the baseline emissions are also as per the same tool		
g. Are the monitoring arrangements described in the monitoring plan feasible within the project design?	VVM	123	Project participant to clarify if there would be any use of i. Start-up fuels ii. R-LNG	**CL 5**	OK
h. Does the monitoring plan provide details regarding calibration of monitoring equipments/ instruments or does it include zero check as a substitute for calibration. As per EB guidance related to calibration (monitoring) requirements, zero check can not be considered as a substitute for calibration?	EB 24	37	Yes the monitoring plan provide details regarding calibration of monitoring equipments/ instruments and it does not include zero check as a substitute for calibration	**OK**	OK
i. Are the following means of implementation of the monitoring plan sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified:	VVM	123	Please refer 7.i.ii above	-	OK
i. data management procedures?	VVM	123	Please refer 7.i.ii above	-	OK
ii. quality assurance procedures?	VVM	123	Please refer 7.i.ii above	-	OK
iii. quality control procedures?	VVM	123	Please refer 7.i.ii above	-	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
8. Sustainable development					
a. Does the CDM project activity assists Parties not included in Annex I to the Convention in achieving sustainable development?	VVM	125	Yes	**OK**	OK
b. Does the letter of approval by the DNA of the host Party confirm the contribution of the proposed CDM project activity to the sustainable development of the host Party?	VVM	126	Yes, the letter of approval by the DNA of the host party no. 4/13/2008-CCC dated. 3 September 2008 confirms the contribution of the proposed CDM project activity to the sustainable development of the host Party	**OK**	OK
9. Local stakeholder consultation					
a. Were local stakeholders (public, including individuals, groups or communities affected, of likely to be affected, by the proposed CDM project activity or actions leading to the implementation of such an activity) invited by the PPs to comment on the proposed CDM project activity prior to the publication of the PDD on the UNFCCC website?	VVM	128	Yes, local stakeholders were invited. But the mode of invitation needs to be provided by the PP	CL 20	OK
b. Have comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity been invited?	VVM	128	The Project participant has taken care for comments from stake holder	OK	OK
c. Is the summary of the comments received as provided in the PDD complete?	VVM	128	OK	OK	OK
d. Have the project participants taken due account of any comments received and described this process in the PDD?	VVM	128	The Project participant has taken care for comments from stake holder and are described in the PDD but the names of the stakeholder who gave comments need to be incorporated	CAR 19	OK
10. Environmental impacts					
a. Have the project participants submitted	VVM	130	Rapid Environmental Impact Assessment had been	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
documentation on the analysis of the environmental impacts of the project activity?			conducted for the project activity by VIMTA Labs Ltd., but the copy of the report is not available for validation		
b. Have the project participants undertaken an analysis of environmental impacts?	VVM	132	Yes the PP had undertaken EIA studies.		
c. Does the host Party require an environmental impact assessment?	VVM	132	Yes, the host party requires EIA under Item no 1D of Schedule of EIA notifications S.O.60(E), dated 27/01/1994 and various ammendements vide S.O. 356(E) dated 4/5/1994, S.O. 318(E) dated 10/4/1997, S.O. 319 dated 10/4/1997, S.O. 73(E) dated 27/1/2000, S.O. 1119(E) dated 13/12/2000, S.O. 737(E) dated 1/8/2001, S.O. 1148(E) dated 21/11/2001, S.O. 632(E) dated 13/06/2002	OK	OK
d. If yes, have the project participants undertaken an environmental impact assessment?	VVM	132	PDD is not transparent on the transboundary environmental & social impacts	CAR 5	OK

Table 2 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 1 and 2	Summary of project owner response	Validation team conclusion
CL 1 : As per the webhosted PDD, section A.3, the second project participant is indicated to be Cantor Fitzgerald Europe. However, it is not clear whether this project	1.b	GVK Industries Ltd. PP has received HCA in September 2008. Other PP's name is removed from the PDD.	The validation team reviewed the Host Country Approval letter no. 4/13/2008-CCC dtd. 3rd September

participant has obtained the DNA approval from the host party ie, United Kingdom.			2008, which indicates the party involved i.e, India having approved the project activity. The revised PDD version 5.3 indicates that there is only one project participant, viz., GVK Industries Ltd. and there is no other project participant. Based on the revision made to the PDD and verification of HCA provided by the project participant, the Clarification Request is closed.
CAR 1 : iii. As per the web hosted PDD, the proposed project activity is a 220 MW Natural Gas fired combined cycle power plant which will comprise of one combustion turbine, one Heat recovery Steam Generators (HRSG) and one Steam Turbine Generator (STG). The purpose of the project and the pre and post project scenarios are not clearly defined in the PDD. iv. It is also noticed that the installed capacity is 228 MW, whereas in PDD and other approvals and financial working it is said as 220 MW.	4.b/4.e	• The purpose of the project activity, pre-project and post-project scenarios are presented in the revised PDD (Refer Section A.2). The PDD, CER calculations and financial model is updated for 228 MW as per installed capacity. The earlier value 220 MW is as per the PPA. • Any EPC supplier has to give performance guarantees on net delivered power and thus keeps a margin for auxiliary power requirement and future heat rate degradation. The GT and STG capacities are in MVA and 228 MW is calculated at ISO conditions and standard 0.8 power factor. This will	In the pre-project activity scenario, there was a gas based power plant operating in the premises of the project activity, of capacity 235.4 MW. This plant was commissioned in 1996-98 in a phase-wise manner. These details have been included in the revised PDD v5.3. Point (i) is closed The validation team has confirmed that the project activity is a 228 MW capacity gas based plant. During the planning stages, the project activity was conceived of as a 220 MW plant. As per the draft PPA signed between G.V.K. Industries Ltd. and APTRANSCO on Nov 30th, 2001, the capacity of the gas based plant was

		vary at the site conditions. As can be seen from the commissioning certificate approved by Andhra Pradesh Power Coordination Committee (dt. 14/04/2009), the gross generation capacity in the test was demonstrated as 231.98 MW. • The project activity is a 228 MW natural gas (only) power plant. The referred plant has naphtha as main fuel and NG as supplementary fuel and an entirely different nature of PPA. The PPA for the project activity was signed in 2003, with natural gas as the only fuel. Thus, all earlier project configurations can be at best feasibility studies and planning. • The pre-project scenario as per CDM Guidelines is no energy generation equipments existed at the site.	specified to be 220 MW. Allowing for the requirements of auxiliary power consumption as well as possible future degradation of capacity, the project participant decided to set up a plant of slightly higher capacity of 228 MW, as is also evident from the agreement signed with EPC contractor, Alstom. The financial analysis of levelised cost and benchmark has also been worked out on the basis of 228 MW capacity. As the Project Participant has provided a satisfactory explanation regarding the plant capacity, the point (ii) is also closed.
CAR 2 : The sectoral scope and project category are not clearly defined in section A.4.2.	4.f	The justification of the chosen category is given now in the revised PDD. A brief description of project activity is presented as to match the requirement	The PDD is revised to make the required corrections. Hence, the CAR is closed.

		of the project category as per CDM Guidelines (Section A.4.2).	
CAR 3 : The project boundary is not demarcated in section B.3 of the PDD.	3.m	The project activity power plant systems (*(1) Gas Turbine -one (2) Heat recovery steam generator – one (3) steam turbine generator – one (4) Station transformers (5) Auxiliary equipments of Gas Turbine and Generator, Heat Recovery Steam Generator and Steam Turbine and Generator; meters (gas, electricity) and gas supply pipelines.)* is described in project boundary and also the connected all power plants (south grid) is shown in the project boundary diagram, Section B.3.	In the revised PDD the project boundary is correctly shown by means of schematic diagram in the section B.3. Based on the above revision, the CAR is vacated.
CAR 4 : How the most plausible baseline scenario is identified is not explained. The options of power generation using fuels other than coal are not identified and discussed.	5.d.b	PDD (section b.4) discusses available alternatives for equivalent power generation like NG- open cycle, cogen mode; coal; wind; hydro; diesel engine based; nuclear; import from other grids. In further analysis, the alternatives that do not provide the similar services as the project activity are discarded from the further analysis steps. A detailed financial analysis is also done for the remaining alternatives – project activity without CDM and coal	The PDD is updated to list all plausible alternatives to the project activity and each of the alternatives is discussed and explained. The financial analysis is also submitted for two alternatives : coal & gas to determine the baseline scenario. As the revisions carried out are sufficient to arrive at the baseline scenario, hence the CAR was closed.

		based power plant.	
CAR 5 : PDD is not transparent on the transboundary environmental & social impacts	10.d	Section D.2 of the PDD is updated to discuss transboundary, environmental and social impacts – referring to the third party conducted rapid EIA study.	The necessary update is done in the PDD and hence, this CAR was closed.
CAR 6 : The value of 160 tCH4/PJ taken by the PP pertains to USA & Canada and for the rest of the world it is given in the said table as 296 tCH4/PJ.	3.t.ii	The calculations are revised using global default value 296 tCH_4/ PJ. Revised PDD, Section B.6.2 and B.6.3 has mentioned and used this value for $EF_{NG, Upstream,CH4.}$	The value of NG, up-stream methane is revised to 296 TCH_4/PJ from the value of 160 TCH4/PJ in the revised documents. Based on the correction, the CAR is vacated.
CAR 7 : • Footnote 8 is missing, • Web link provided in Footnote 11 is not correct, please provide the correct link • Web link in footnote 14, 19, 25, 28 doesn't open	3.n.iii	o Footnote 8 was hidden in formatting, is seen now. o Footnote 11 is reattached and confirms the sentence for which it is used in the PDD. o The web links 14, 19, 25 and 28 are attached in pdf form.	The footnotes are provided in the revised PDD; hence, this CAR is closed.
CAR 8 : • The CEA data base used for determination of Emission Factor doesn't mention the version used	3.p.i	Central Electricity Authority (CO_2 Baseline database for the Indian power sector, Version 3.0 is used and mentioned accordingly in Section B.6.2	The relevant details are mentioned in the PDD and hence, the CAR is closed.

• Calculation used to deduce the value for efficiency for the baseline plant is not provided		and B.6.3. The calculation used for deducing value of efficiency for the baseline plant is also explained in the CER sheet.	
CAR 9 : The names of the stakeholders who commented in the stake holder meeting are not mentioned in the section E.2. Kindly provide the names accordingly	3.hh.i	The names of the stakeholders who raised queries are updated now in the PDD, Section E.2.	The details needed are provided in the revised PDD submitted by the Project Participant to the validation team. Hence, the CAR is closed.
CAR 10 : Baseline emission factor $EF_{BL,CO2,y}$ is required by monitoring methodology to be monitored ex post. However, the same is not included in the monitoring plan in section B.7.1		The grid emission factor is included in the monitoring plan in Section B.7.1 of the PDD.	The Baseline emission factor $EF_{BL<CO2,y}$is now included as an ex-post monitored parameter in the revised PDD. Hence, this CAR is closed.
CAR 11 : The monitoring arrangements are not described in detail in section B.7.2 of the PDD. The following parameters are not provided in section B.7.1 **1.** $FCf_{LNG,y}$ is not specified **2.** $OXID_{LNG}$ **3.** OXID $EF_{CO2,f,y}$ i **4.** $COEF_{,y}$ and PE_y is also not specified.		The monitoring arrangements are presented in detail in the revised PDD. All applicable parameters mentioned in the CAR are not used in the updated monitoring plan.	The monitoring plan in the section B.7.1 of the revised PDD is updated. $COEF_{NG,y}$ is included as a monitored parameter. PE_y also is included. $FC_{LNG,y}$ and $OXID_{LNG}$ is not applicable to the project activity, as confirmed by the validation team during its site visit, because there is no possibility of the use of LNG in the project activity. $EF_{CO2,f,y}$ is included in section B.6.2 of the revised PDD. As the monitoring arrangements specified in the revised PDD are now complete and also found to be in line with the actual site arrangements, this CAR was closed by the

			validation team.
CAR 12 : The sensitivity analysis is carried out for ± 5% only, which is not as per the guidelines on Investment Analysis as stipulated in EB 62 Annex 5. Also, the sensitivity analysis has been carried out only for the benchmark analysis involving the project IRR. The levelised cost computation carried out for demonstration of the baseline alternative has not been subjected to a sensitivity analysis	6-c-oo	The sensitivity analysis is done for ± 10% in the updated PDD. The levelised cost of electricity generation used for baseline determination is also subjected to sensitivity analysis. Further, the actual values of all these parameters are also given to confirm that the range of sensitivity is appropriate and covers the actual plant performance.	The Project Participant has increased the sensitivity range from 5% to 10%. In addition to the IRR, levelised cost also has been subjected to sensitivity analysis. Hence, the CAR is closed.
CAR 13 : The justification provided in Appendix 1 of the PDD for availability of natural gas to satisfy the applicability condition of the AM 0029 v3 methodology does not transparently explain the following : • Supply position of natural gas in mmscd • Existing demand and expected future demand in mmscd for similar power plant projects • Supply-demand gap The justification is, at places, vague and repetitive	5-a-i	The gas availability note is modified to include the comments given (Appendix 1 in the revised PDD). A provision for monitoring this applicability condition in accordance with the EB Clarification (AM_CLA_0091) is also included in the revised PDD.	The Project Participant has revised the justification offered to show that the project activity meets the applicability condition of methodology related to availability of natural gas. The validation team has verified all the sources referred to in the same and these were found to be reliable to demonstrate sufficient availability of natural gas. Hence, the validation team closed the CAR raised.
CAR 14 : The levelised cost for coal & naptha is not supported by detailed financial spreadsheets.	6-c	The financial model is being submitted for baseline alternative i.e. coal In 2000, Government of Andhra Pradesh discontinued naphtha based proposals due to the fuel price volatility. Thus, the option is not considered further. This alternatives was not	It was confirmed that use of naptha in the project activity is not a feasible choice for the Project Participant as the state Government of Andhra Pradesh discontinued the consideration of naptha based power generation proposals, due to the

		discussed in the web hosted PDD.	volatility of naptha, which would affect the cost of power. Hence, naptha based power generation was ruled out by the Project Participant and is also agreed to by the validation team. The detailed financial spreadsheet for the coal option was provided by the Project Participant and vetted by financial experts in the validation team, M/s. Sushil Budhia & Associates. On the basis of the same, the CAR was closed
CAR 15 : Approved methodology AM 0029 stipulates the additionality of the project activity to be presented considering Benchmark Analysis [Refer Step 1 of "Additionality" in the AM 0029 methodology]. However the benchmark analysis is not presented in the section B.5 of the webhosted PDD.	6-	The Section B.5 is now revised to include the benchmark analysis to present the additionality. The project IRR is chosen financial indicator as the project is 100% debt financed. This is then compared with the local commercial lending rate (which can be used as benchmark in line with Guidance 12 of the EB62, Annex 5).	In response to the validation team's CAR, the Project Participant prepared a financial working of project IRR for the investment in gas based plant. The IRR value computed was compared to local commercial lending rate of the bank. As the benchmark investment analysis has been carried out in the revised PDD, the CAR was closed.
CAR 16 : The chronology of events does not illustrate the project implementation schedule and progress of CDM related activities separately in the PDD, section B.5.		The Section B.5 of the PDD is updated to give a project implementation chronology and parallel CDM registration efforts. The CDM registration efforts show that the PP had signed ERPA for sale of generated CERs from the project activity plant	The chronology of events described in section B.5 of the revised PDD lists all milestones achieved by the project activity on the implementation front and related to actions taken to secure CDM status, as separate activities. The chronology now shows

		within 2 years from the start date. Then consultant was contracted for CDM services, agreement was signed with DOE for the validation of the project activity and the PDD was webhosted for global stakeholder comments within two years from each milestone. Thus, the PP has taken real and continual actions for the CDM registration in line with the Guidance of EB62, Annex 13, clause No. 7 and 8.	the two types of events separately. Hence, the CAR is closed.
CAR 17 : The basis for various costs considered as input parameters (such as O&M charges, etc.), is taken in the levelised cost analysis to be as per the EPC contract. According to the EB's investment guidance (EB 62 Annex 5), however, the input values should be as applicable as per the data available at the time of decision	6-c-m	The input parameters considered for the investment analysis are now updated in Section B.5 and all parameters were available at the investment decision. The project cost was taken from the EPC quote from Alstom Power (Switzerland) Ltd. and other costs were from draft PPA, earlier project appraisal memorandum by IDBI bank etc.	All input values taken in the revised PDD are now based on sources of information available to the Project Participant at the time of the investment decision. Hence, the CAR is closed.
CL 2 : The technology involved is combined cycle electricity generation system. However it is not clear if there will be supplementary firing in HRSG	3.g.iii.	The HRSG is unfired type and there will not be any supplementary firing. It is updated in the PDD, Section A.4.3.	It is clarified in the revised PDD that there is no supplementary firing involved in HRSG. Based on above clarification the CL is closed.
CL 3 : The project participant requested to clarify if the alternate fuels or combination of fuels are envisaged in the project activity.	3-g-iii	Possible fuel for the Gas Turbine other than NG is HSD. However, the project activity will run only using NG as per the management	The project participant has provided required clarification. Hence the Clarification request is vacated.

		decision and revised PPA that had deleted alternative fuel clause.	
CL 4 : Project participant needs to clarify how it is ensured that the natural gas would be the primary fuel to be used in the project activity at all times	3.h.ii	A provision is made in the revised PDD section B.7.1 to monitor any other start up / cofired fuel if at all used, to be used for applicability (1% of energy value) and project emissions calculations.	In the revised PDD, in section B.7.1, an additional parameter $FCf_{,FF,y}$ is included as the monitoring parameter which is the quantity of any other fossil fuel consumed in the project activity for the start up or co-firing purpose. The monitoring of this parameter will indicate the quantity of other fuel that will be used and to what extent it will be used. Hence the Clarification request is closed.
CL 5 : Project participant to clarify if there would be any use of 1. Start-up fuels 2. R-LNG		There is no start up fuel required and thus, it will not be used. Further, as confirmed in the site visit, R-LNG also will not be used in the project activity.	The Project Participant has clarified that no start-up fuels /LNG would be used in the project activity. The validation team and its technical expert who accompanied the team at the site, also confirmed from their observations and from interviews with the plant operations personnel and the plant head that the project activity uses only natural gas and there is no use of any start –up or supplementary fuels. The use of LNG is also ruled out. Hence, this clarification request was closed by the team.
CL 6 : The extract of the resolution of the Board of Directors	6.a.h.ii	The investment decision as per the PPA finalised is 220 MW. The PPA is	The actual project capacity is 228 MW. The increased capacity takes

of GVK dated 28-Feb-2003 states the capacity of the project 220 MW. Commissioning certificate approved by APPCC also indicates the capacity to be 220 MW. However the project capacity in the EPC contract documents of Alstom Ltd is 228 MW.		for 220 MW, and thus provision is made in terms of higher generation capacity to account for auxiliary consumption and future heat rate degradation. As can be seen from the commissioning certificate approved by Andhra Pradesh Power Coordination Committee (dt. 14/04/2009), the gross generation capacity in the test was demonstrated as 231.98 MW. This is usual with all large thermal power plants. The PDD is based on planned 228 MW capacity at the EPC contract and contractor was required to given guarantee for this capacity.	care of auxiliary consumption and possible degradation in the project capacity in future, in order that the project activity may be able to supply the required quantity of power (220 MW) to the APTRANSCO, as per the Project Participant's commitment in the PPA. The investment analysis is also done based on a total capacity of 228 MW and not 220 MW. Hence, the validation team has closed this clarification request.
CL 7 : Project participant project participant is requested to justify the consideration of 85% PLF for the project activity.	6.c.r	The PPA (clause 3.7) of the project activity plant has used 80% PLF for capacity charges calculation and incentives there further. PP estimates that with required O&M and other shut downs, 85% PLF is achievable. Further, a 10% sensntivity analysis is also carried out to include the highest achieved PLF in last two years of operation. Thus, this is conservative considering higher revenue is estimated for demonstration of additionality. The value is same as that used for the baseline alternatives	The validation team has noted that draft Power Purchase Agreement (PPA) dated 30th November 2001 signed between APTRANSCO and GVK Industries has considered a PLF of 80% (Clause 3.1 & 3.2). The PLF of 85% considered in the project financials is hence a more conservative assumption. The CL-7 is therefore closed.

		analysis and a sensitivity analysis is also conducted on PLF.	
CL 8 : Only two parameters- PLF and fuel cost are considered for the sensitivity analysis. Project participant is requested to explain why other parameters such as project cost, station heat rate, O&M cost, are not considered.		The sensitivity analysis is now revised to include all the variables as below. Capital cost Fuel price Heat rate Plant load factor O&M cost Auxiliary consumption Interest rate Escalation on O&M cost	Sensitivity analysis is expanded in the revised PDD to cover other parameters in addition to PLF & fuel cost. The results are tabulated in the revised PDD. Hence, the CL-8 was closed.
CL 9 : The actual O&M cost is observed from the O&M agreement to be only 3.3 % of the total project cost, on an average. PP to explain why the sensitivity should not be extended to -17% for this input parameter.		As per the O&M cost (submitted to DOE) for the project activity, the project will spend on an average 3.3% for the regular and major maintenance. Thus, the sensitivity was extended to -17% (from 4% used in the investment analysis as per investment decision) and the levelized cost at that O&M costr is 1.47/kWh (compared to 1.39/kWh of coal at base conditions) and project IRR is 11.24% compared to 14.5% benchmark.	A sensitivity analysis extending the range of variation in the O& M cost of upto -17% was carried out and submitted to the validation team. Results of this analysis indicate that even after subjecting the O&M cost to a -17% change, the levelised cost of gas still remains higher than that of coal. The IRR value also remains within the benchmark. Hence, the variation does not materially impact the results of the financial analysis and the conclusions still remain valid. The clarification request was

			therefore closed by the team.
CL 10 : There is a significant difference between assumed value of the input parameter and the actual values for loan interest rate and auxiliary consumption. The variation is more than 10%. Project participant to justify why these parameters should not be subjected to higher sensitivity range.		The interest rate applied for demonstration of additionality is 10.25% and on doing -10% sensitivity, this rate becomes 9.68%. The interest rates as per actual common loan agreement (pg. 126) was 9.92%. Thus, this gets covered in the sensitivity analysis. For the Auxiliary consumption, as the plan t is new, a lower (1.63 and 1.95 in first and second years respectively) than recommended by CERC (3%) values for auxiliary consumption were observed. However, as demonstrated from the other experience of existing plant with the PP, this increases over the life of the plant. Further, as this value is only 3% of capital cost, has a small impact on the financial indicators. A -50% sensitivity on auxiliary consumption (to take 1.5% of total generation), the levelised cost is □ 1.48/kWh (compared to □1.38/kWh of coal alternative at -10% auxiliary consumption) and IRR is 10.06% (unchanged from base IRR and lower compared to the benchmark used).	The revised PDD contains sensitivity analysis on loan interest rate as well as auxiliary consumption of the plant. Hence, the CL-9 is closed by the validation team.
CL 11 :		The PP is monitoring the net export to	The imports of electricity from the

Project participant to explain how the project electricity imports from the grid are taken into account in the emission reduction computations		the grid (total export – total import from grid) as per the monitoring methodology provisions. PP neither found requirement of monitoring imports from grid neither the provision for the project emission calculations for this parameter in the monitoring methodology.	grid are accounted in the calculation of net electricity exports, which are the difference between total exports and total imports. At the site, the validation team paid a visit to the switchyard meter control room and has observed that the energy meters installed there are bi-directional type, which can measure exports as well as imports. The CL-11 was hence closed.
CL 12 : The webhosted PDD does not quote the supporting reference for the techno economic parameters of the project activity.	6-c-o	Section B.5 has given detailed techno-economic assumptions and its evidences in the PDD.	The techno-economic parameters are adequately referred to in the revised PDD. Hence, this clarification request is closed.
CL 13 : The project participant needs to explain why 220 MW gas based plant is compared with 250 MW coal for the levelised cost analysis.	6-b-b	The nearest standard available block sizes in coal based power plant are 210, 220 and 250 MW (Ref. CERC Order – Terms and Conditions of Tariff, 2004). The 250 MW baseline coal plant is used for the comparison as 210 and 220 MW plants will not deliver the similar output as the project activity. The electricity generated by these two plants is only 2.87% (based on difference in PLF). This justification is presented in the CER sheet and the Section B.5 of the PDD.	The energy generation by the gas based power plant of 228 MW capacity at an operating PLF of 85% can be realised by an equivalent coal based plant of 243 MW operating at the same load factor. However, as explained by the Project Participant in their response and also confirmed by the validation team by referring to CERC orders for the determination of the terms and conditions of tariff, the standard capacity of coal based power plants is 250 MW. Hence, the validation team agrees that comparison with a 250 MW coal

			plant is appropriate and the clarification request was closed.
CL 14 : 1) The description for common practice does not transparently explain why the project activity cannot be regarded at the common practice in the region. ii) Discussion on common practice analysis in section B.5 of the webhosted PDD does not clarify what criteria were used in terms of project scale, technology, operating environment, etc. to decide on the selected projects "similar" to the project activity. The project participant is also requested to explain how the common practice analysis is demonstrated as per Annex 12 guidance of EB 63.	6-h	Common practice discusses the contribution of NG based power in each Indian grid. Further, as suggested in the Additionality Tool, other plants in the region operating under the similar conditions are identified and it is mentioned that all the plants are under various stages of CDM registration. Based on CEA database, all power projects are considered now and the common practice analysis is updated to decide similar projects. The fraction F is calculated now and is less than 0.2. Thus it is demonstrated that the project activity is not a common practice.	Discussion on common practice analysis in the revised PDD has explained how the project activity is not a common practice in the selected geographical region, i.e. India. The demonstration of common practice analysis also meets the requirements specified in the Additionality Tool of EB 39 v06 and the latest guidance in EB 63 on common practice analysis (Annex 12) Hence, this CL-14 was closed..
CL 15 : The project participant is requested to justify the consideration of coal based sub-critical power plant as a baseline alternative, given that a natural gas power plant of capacity 235 MW, owned by them at the same site was already in operation and actions taken by the project participant prior to the date of decision suggest that a capacity expansion of the same was being planned. An environmental public hearing was	5-d-f	The baseline methodology AM0029, pg 2 under the 'Identification of the baseline scenario' requires '*the baseline scenario candidates identified may not be available to project participants, but could be other stakeholders within the grid boundary (e.g. other companies investing in*	The methodology specifically provides with the guidance that the most plausible alternative for the project activity may not be available to the project participant but could be available to any investor within the grid boundary but that alternative should be on similar services like Peak vs Baseload. Envisaging this

[*] http://www.financialexpress.com/printer/news/63579/

[†] http://www.processregister.com/Visakhapatnam_Power/Project/pid6967.htm; http://hindujanationalpower.com/

conducted by the Andhra Pradesh Pollution control Board on 07.12.1999, minutes of which are available as evidence. The minutes state that project participant was planning to set up 390 MW capacity plant in Phase-II (Phase I being the previous 235 MW plant) and the fuel requirement of this plant would be met through a mix of 72% natural gas and balance 28% naptha. There is no reference to coal based power plant. Justify on what basis a coal based power plant could be regarded as a credible alternative.		*power capacity expansions). Ensure that all relevant power plant technologies that have recently been constructed or are under construction or are being planned (e.g. documented in official power expansion plans) are included as plausible alternatives.*' There were two coal based IPP projects under development in Andhra Pradesh with same power purchaser (APTransco) (1) 2x260 MW coal-based plant of BPL Power Projects (AP) Ltd. at Ramagundam* (2) 2x520 MW Visakhapatnam Power Project by Hinduja National Power Corpn. Ltd.† Thus, the coal based power plant option was available to other stakeholders in the grid. Further, in January 2002, GVK was awarded coal mine for a under consideration 500 MW subcritical coal based power plant. Thus, the opion of developing a subcritical coal based power project was also a credible alternative. A number of actions are needed to assess the feasibility of a project including EPC contract, PPA, FSA, environmental clearances etc. Thus, these different steps were also taken by PP to study the feasibility of a power project and the public hearing referred	approach the project participant has justified that the Coal is the most plausible alternative to the project activity with the reference of 2 coal based thermal power projects that were set up on the similar services as that of the project activity. These projects are the investment of the other Stakeholders within the grid boundary ie, Southern Grid, which is allowed under the methodology. Further to this, the project participant was also awarded a coal mine for the Sub-Critical Coal Based Power Project which was about one year prior to the decision of current project activity. The above explanation proves that coal could have been the most plausible alternative to the project activity. The explanation provided by the Project Participant regarding the coal based option being a realistic alternative to the project activity is therefore regarded as satisfactory by the validation team and the CL-15 raised was closed.

		was part of this feasibility study. These pre-feasibility steps are needed to approach financiers including banks as evident from the letter from Bank (submitted to BVCH). Also, in January 2002, GVK was awarded a coal mine for a 500 MW coal based power plant (http://coal.nic.in/alloblocklist.htm) [Refer Sl. No. 19 - GVK Power (Govindwal Sahib) Ltd.]. Thus, GVK management had the option of going for a coal based power plant instead of the CDM project activity power plant. Thus, coal can be considered a credible alternative. This is also described in the Section B.4 of the revised PDD (pg. 13-14).	
CL 16 : The prior history of the project activity indicates action taken towards setting up the project. It is learned from various documents submiited by the project participant that: • The expansion of the previously existing 216MW gas based plant at the same site was in state of planning from 1996-97 • On 08/07/99, MoP and NG allocated 1.1MCMD gas supply that would have		The PP would like to submit that the present project activity involves commissioning and operation of a new NG based combined cycle power plant. Also, the project activity's capacity, secondary fuel and PPA are different from the various configurations listed in the query raised by DOE that existed during the various stages of planning, The point wise differences between the plant referred in query and the project activity are presented below.	As explained by the Project Participant in their response, a number of steps were taken initially such as obtaining the environmental clearance, various consents and approvals, public hearings for the environmental impact of the project activity, etc. However, all these steps were the pre-project actions taken without which it would not have been possible for the Project Participant to

partly covered the requirements for the 360MW expansion • Environmental Clearance was accorded to GVK for setting up power plant of capacity 235 MW on 24 June 1997 • APPCB accorded its consent to GVK on 20/04/2000 to establish the Gas based plant • The draft PPA was submitted to GVK by AP Transco on 05/12/2001 which stipulated the nominal installed capacity to be 220 MW and the primary fuel as Natural Gas • On 19/12/2002, the public hearing was conducted by APERC for PPA of gas based plant In the view of the above events taken place, please clarify the actual date of decision for this project activity as the Board Resolution to set up the project activity came later on 28/02/2003		1) The expansion project was based on 'gas and supplementary fuel' as is evident from the PPA on 18/06/2003, pg. 4, para 3. The PPA also lists that the expansion project was to have a capacity 235 MW and operate on gas and naptha. Hence, this is not comparable to the project activity. 2) Although there was gas allocation of 1.1 MMSCD from MoP&NG and a fuel supply agreement with GAIL, this agreement is one of the requirements in the assessing power plant feasibility. This alone is not sufficient to decide on project activity, other parameters including environmental clearance and PPA terms were still pending as on 1999. 3) Environmental clearance dated June 1997 is for a naptha based power plant. The Environmental Clearance for natural gas as primary fuel for the project was on November 2000. The clearance of November 2000, is another stage in the process of approvals needed to conceptualize a plant i.e. pre-project activities and thus both these clearances do not result in implementation of the project activity.	take a formal decision to set up the project activity. The formal decision of the project activity is therefore justified as the date of the Board decision, viz., 28/02/2003. Hence, the CL-16 was closed.

		4) The APPCB regulatory clearance is a pre-project activity needed as part of the feasibility assessment. Pollution board clearance is another pre-project activity needed prior to decision making. 5) The draft PPA was presented to the PP for discussions. The draft PPA of December 2001 included a supplementary fuel clause and other terms which were modified later based on discussions between the PP and APTRANSCO. Also, Public Hearing on the PPA was conducted in December 2002 and the PPA was still in a 'draft' stage. PPA is a key element to decide on the revenues from the project and hence decision did not occur prior to public hearing on the draft PPA. Also, the PPA was signed on June 2003. 6) The public hearing on PPA was conducted before approval of the PPA terms by APTRANSCO. Based on the comments in the public hearing the PPA terms were finalized. Thus, this can be considered as the first point in time when key elements needed for decision on the project activity were available for decision making	

		a. PPA b. Fuel supply agreement c. Environmental clearance All earlier steps were needed to assess the feasibility of the project activity. Hence, the decision was taken on 28 February 2003 as key parameters of the project were finalized.	
CL 17 : The board resolution compares to two proposals one based on Coal being the fuel and other on Natural gas as the fuel. Project participant may please clarify as to how there could be a proposal for setting up the coal based power plant when previous action indicate the capacity expansion is based on Natural gas &/or Naphtha.		The PPA structure of the project activity power plant discussed during the public hearing in Dec. 2002 had merit order dispatch clause. Under this, the dispatch from the individual power producing stations will be taken by the DISCOM based on the Merit order dispatch. The generating station which produces high cost power will be first asked to back down. The system aims at reducing cost of power. As the project activity will be competing with the coal based power plants from state utilities like NTPC and IPPs, it was noted in the Board meeting during the investment decision. Hence comparison of cost of power from coal plants vis-a-vis the proposed project activity was needed to assess the feasibility of operating at designed PLF, this was discussed during the Board meeting.	The validation team compared the extract of the Board resolution recording the investment decision on 28.02.2003 with its original maintained at the Project Participant's corporate office at Hyderabad, on 18.10.2011. The extract was found to be matching in content with the original. Hence, the CL-17 was closed by the team.

CL 18 : Project participant to explain the reason for not considering Lignite as one of the plausible alternative.		The PDD during baseline development has considered the lignite based power generation as an alternative. However, as lignite has property of spontaneous combustion, all the lignite power plants in India are pit head based. Also, in southern grid of India, there is no private sector power plant based on lignite, even to date (CEA CO_2 baseline database for Indian power sector, version 06 – tailored for private sector and lignite fuel is presented to BVCH). The only lignite based power plant in the southern gird is owned and operated by NLC and NLC has its captive lignite mines. Thus, lignite was not considered as a realistic alternative and not discussed in further steps of baseline development.	The validation team confirmed from the CEA database that the option of lignite based power generation was not a feasible option to come up within the Southern grid, as lignite mines in India are those owned by the Neyveli Lignite Corporation (NLC) which uses the lignite mined for its own captive consumption in its power plants. Hence, the exclusion of lignite option from the baseline alternatives is justified and the CL-18 was closed.